

## MOMENTUM—

by  
Norman G. Shidle

**B**ETWEEN now and Jan. 1, 1932, a few smart, courageous, fighting companies are going to jump the gun in the race back to business prosperity.

While their competitors are waiting for the tearing of a sheet from the calendar to metamorphose economic conditions, new pioneers in the automotive industry are going to ACT.

These go-aheaders have faced reality—stark, crystal-clear reality. They see:

Wholesalers and retailers questioning the permanent stability of every line and every manufacturer with whom they are doing business;

Scores of trade buyers passing on from one to another strange, weird, silly rumors—sometimes about even the oldest and strongest companies in the business;

Hundreds of sensible retailers wavering in their belief in the soundest of projects; hungry for leadership; ready to form new allegiances; eager to cry "Hail" to the industrial organization which moves with dominant strength.

Opportunity is wide open between now and Jan. 1, 1932, for new firms to seize or old firms to consolidate leadership in each branch of the automotive industry. Some men see that chance clearly—and will grasp it.

While their competitors are reefing sail still further "until after the first of the year," listlessly, penuriously, fearfully hoping that a change in date on the calendar will in some mysterious way bring a change in their fortunes—while the great herd of business men are toasting their toes before a dimming fire—

These new pioneers are going to use these three vital, opportunity-filled months to advertise to the trade—to contact with the trade—to write to the trade—to fill the trade with a vitalized vision of the everlasting power and courage of their plans, their organizations, their methods and their purposes—

They will reach the trade in its most receptive mood;

and when it is less crowded than ever before with competitive messages.

They are going to stand out like tall pines towering high in a forest of weeping willows.

They are going to be conspicuous in their activity, sound in their judgment, and far-visioned in their planning.

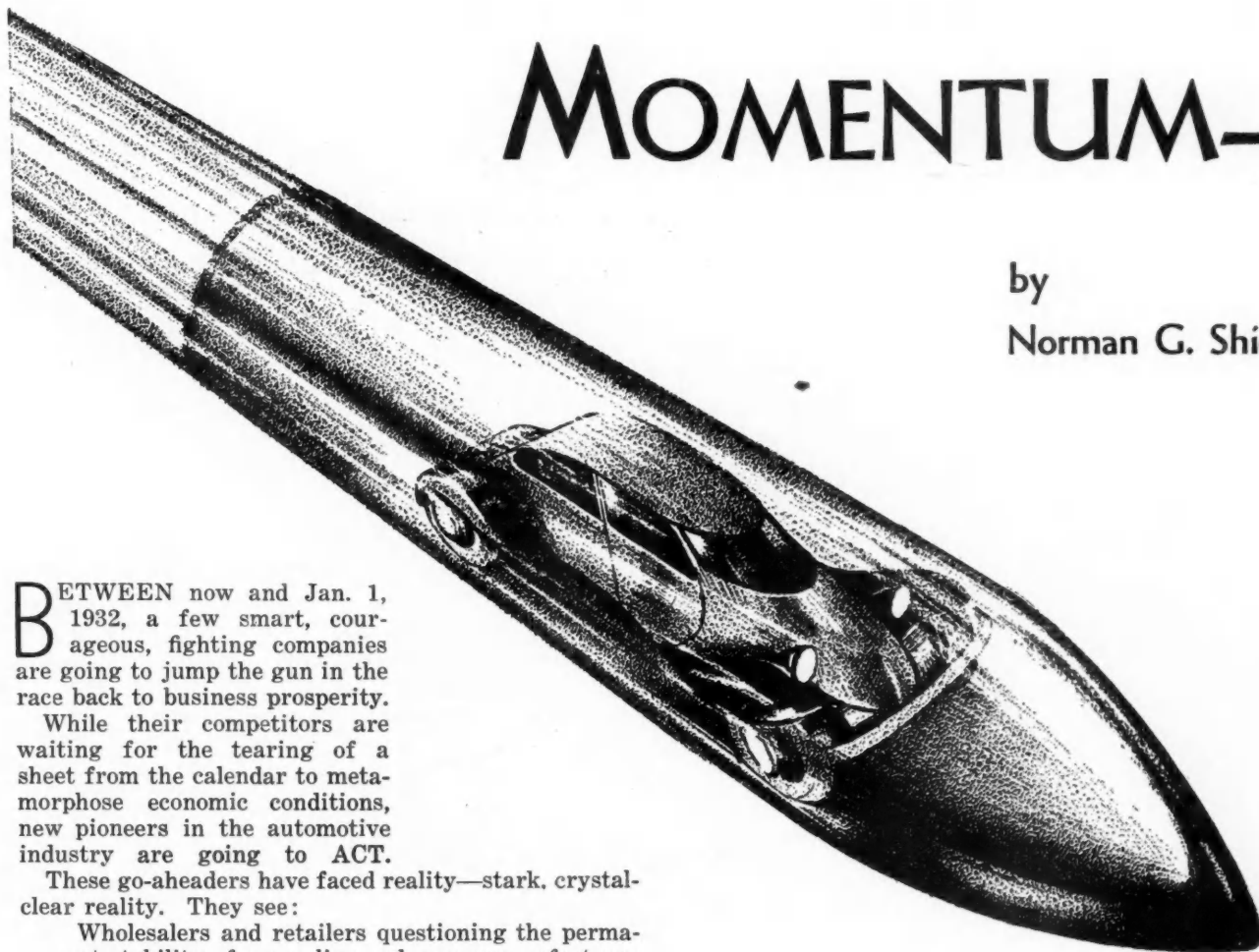
And when that subtle thing called the tide of business suddenly is found to have turned, they will have just the advantage that a man doing a running broad jump would have were he competing for distance with a man compelled to do a standing broad jump.

They will have the most potent and powerful advantage over competition that any company can possess—MOMENTUM.

They will have gathered that momentum slowly, imperceptibly at first, but with gradually increasing velocity. The first breath of really good business winds will blow them forward to permanent leadership, before it ever becomes strong enough to budge from the starting point their inertia-bound fellows.

October—November—December of 1931—

The companies which will be business leaders in the automotive industry before the end of 1932 must already see those three months as months of great opportunity!



# Improvements in Equipment Promise Rifle Drilling of Connecting Rods

There are now produced drills of special design with high speed steel tips electrically welded on heat-treated seamless tube by a new process

**D**ELVING into the recent studies of engine design, particularly in the field of engine lubrication, we find little, if any, discussion of wrist-pin lubrication. Does this mean that the details of this vital element have been standardized and no longer present a problem to the designer? Without hesitation the answer comes as a loud chorus of noes. What is the status of wrist-pin lubrication? Will it be pressure feed or splash, and why?

Part of the answer lies in the specifications of this year's engines. And since a qualitative comparison over a period of years may indicate some trend, we have made a complete analysis of passenger car and truck specifications for the years 1928 to 1931 inclusive. A recapitulation of the monthly specifications published in *Automobile Trade Journal* appears in Table 1. For the purpose of comparison we have set up a ratio between the number of makes with pressure feed to the pins and the number of makes listed. The ratios are 39.2 per cent for 1930, 39 per cent for 1929, and 30.9 per cent for 1928.

Table 2 shows a similar study of truck specifications taken from *Commercial Car Journal*. For convenience we have set up a different relation, namely that of the number of models with pressure feed to the total number of models listed. These ratios are 33.8

per cent for 1931, 32.1 per cent for 1930, 29 per cent for 1929, and 25.9 per cent for 1928.

Going a step further, we list in Table 3 the makes and models featuring pressure to the pins for the years 1928 and 1931 inclusive. It struck us as a most significant thing that, with only one exception, no manufacturer has discontinued the practice once it was adopted.

Now, as everyone knows, most engineers and service men have violent likes and dislikes when it comes to wrist-pin lubrication. Some are based on personal opinions; some on divergent engineering points of view. But much of the prejudice against pressure feed to the wrist pins is due to early experiences with "plumbing" and drilling the connecting rod. In this respect the picture today is much more encouraging.

To get a fair cross-section of opinion concerning this problem, the writer recently called on a large group of engine designers and service men on both sides of the fence. The opinions and suggestions of these experts form the basis of this article.

The following discussion, of course, deals only with engines having pressure feed to main bearings.

Two preliminary observations might well be made at this point. One is that more and more engineers are thinking seriously about the advisability of adopting pressure feed to the wrist pins; the other, that it will not be surprising to find several car manufacturers announcing rifle-drilled connecting rods some time in the very near future.

A demand for pressure lubrication to the wrist pins from some quarters came as the result of complaints due to noise and wear of piston pins.

Several years ago it was not uncommon to replace pins, and sometimes pistons, within the first 3000 miles of running on certain popular-priced cars. To overcome these service complaints, closer production tolerances were found necessary.

Rifle-drilling of connecting rods came in about the same time as the diamond-boring of the small end. Probably one of the first popular-priced cars to use rifle-drilling equipment was Oldsmobile. Their process and equipment were described in *Automotive Industries*, July 20, 1929, on page 89.

One of the signal advantages claimed by proponents of pressure feed is the possibility of operating with a greater clearance between wrist pin and bearing, if desired, although, by the same token, closer tolerances may be safely maintained without selective assembly.

**Table 1. Analysis Passenger Car Makes With Pressure Feed to Wrist Pins**

	1931	1930	1929	1928
Makes (Pressure to Pins).....	13	14	16	14
Total Makes Listed .....	38	45	47	46
Models (Pressure to Pins) .....	28	23	20	21
Total Models Listed .....	83	105	95	109

1931—From A.T.J. Specifications—July, 1931

1930—From A.T.J. Specifications—July, 1930

1929—From A.T.J. Specifications—July, 1929

1928—From A.T.J. Specifications—July, 1928

# Economies in

by Joseph Geschelin

It has been demonstrated, too, that within reasonable limits there is no wrist-pin knock even if the clearance is large.

One well-known engine designer told us of an investigation he made recently with an engine which developed overheating under certain conditions. Careful measurement at the wrist pins indicated an expansion of 0.0004 in. on the diameter. This was a splash-feed

## Table 2. Analysis Truck Models With Pressure Feed to Wrist Pins

	1931	1930	1929	1928
A. No. Models (Pressure to Pins) .....	269	256	252	206
B. Total Models Listed....	797	797	871	796
C. Percentage—A/B .....	33.8	32.1	29.0	25.9

1931—From C.C.J. Specifications—July, 1931

1930—From C.C.J. Specifications—July, 1930

1929—From C.C.J. Specifications—July, 1929

1928—From C.C.J. Specifications—July, 1928

## Table 3. List of Passenger Cars With Pressure Feed to Wrist Pin

Make	Model	1931 Piston Material	Model	1930 Piston Material	Model	1929 Piston Material	Model	1928 Piston Material
Blackhawk .....			L6	Als	L6	Als		
Cadillac .....	355	B	353	NI	341B	NI		
Cadillac .....	370	B	452	CI				
Cadillac .....	452	B						
Cunningham .....	V-9	CI	V-9	CI	V-8	CI	V-7	CI
Duesenberg .....	J	AI			8	AI		
Elcar .....			120	Als	120	Als		
Hupmobile .....	S-2	Als	Cent. 6	AI	A	CI	Cent. 6	CI
Hupmobile .....	L	AI	Cent. 8	AI	M	CI	125-8	CI
Hupmobile .....	C	CI	C	CI			Cent. 8	CI
Hupmobile .....	H, U	AI	H, U	AI			8-90	Als
Kissee .....								
La Salle .....	345	B	340	NI	328	NI		
Marmon .....							E-75	CI
McFarlan .....							TV6	AI
McFarlan .....							ST. 8	Als
Nash .....	960	Als	Single 6	Als	Std. 6	Als	Std. 6	Als
Nash .....	970	Als						
Nash .....	980	Als						
Nash .....	990	Als						
Oakland .....	8	B	8	CI				
Oldsmobile .....	F-31	CI	F-30	CI	F-29	CI		
Packard .....	901	Als	733	Als	6-26	Als	526	Als
Packard .....	902	Als	728	Als	6-33		533	Als
Packard .....	903	Als	740	Als	6-40,		8, 443	Als
Packard .....	904	Als	745	Als	6-45	Als		
Pierce-Arrow .....							81	Als
Pierce-Arrow .....							36	CI
Reo .....	31N							
Reo .....	Roy 35N	AI						
Rolls-Royce .....	Phan.	AI	Si. Gh.	AI	Si. GH.	AI	Si. Gh.	AI
Rolls-Royce .....			N. Ph	AI	N. Ph	AI	N. Ph	AI
Stearns-Knight .....					M&N6-80	Als	e	AI
Stutz .....	LA	Als	Series M	Als	Series M	Als	BB	CI
Stutz .....	MA	Als						
Stutz .....	MB	Als						
Viking .....			V-30	CI	V-29	CI		
Willys-Knight .....	66D	Als	66B	Als	66A	Als	Great 6	Als
Willys-Knight .....	8-80D	CI						
Willys-Knight .....	95	Als						
Willys .....			8-80	CI				

AI—Aluminum.  
Als—Aluminum (strut type).  
B—Semi-Steel

CI—Cast Iron.  
NI—Nickel Iron.

engine and the maximum permissible clearance at the wrist pin for operation without noise was 0.0007 in., thus leaving a clearance of only 0.0003 in. under normal operating conditions. His conclusion was that at high speed and maximum power the clearance was insufficient and that several of the rods were prevented from articulating by temporary freezing at the bearing. This same engineer told us that in his opinion it was entirely feasible to operate with pressure lubrication with a clearance as high as 0.0020 in.

One of the objections voiced by several men is that of inability to control oil flow with pressure feed. This is not substantiated by others, particularly those engineers who have built engines with rifle-drilled rods. They feel that oil flow is a function of the clearance at the bearings and may be readily controlled by proportioning this clearance properly. One engineer specializing in the design of heavy-duty industrial engines found it possible to positively control oil flow at the piston bearings by controlling the developed length and pattern of the grooves in the bearing. The dimensions for these were developed experimentally.

Part of a battery of three Pratt & Whitney 6-spindle deep hole drillers in a well-known automotive plant. This machine requires a floor space of 70 x 100 in. and weighs about 13,400 lb. Oil under 500 lb. pressure is fed through the drill shank to assure freedom from chips.



In production, close clearance and fine tolerances generally mean selective assembly on most high-grade jobs. This imposes a heavy burden on the machine shop, assembly department and inspectors. With pressure feed and wider tolerances, it is claimed that these operations are much simpler. Naturally, the production department has many angles to consider, but where quantity warrants it, the rifle-drilling method will probably show over-all economy. In the early stages only small production jobs had drilled connecting rods. Then it was an expensive process because horizontal machines were employed which drilled the rod from  
(Turn to page 404, please)

Table 4.

### American Stock Engines With Pressure Oil Feed to Wrist Pins

Make and Model	Piston Material	Make and Model	Piston Material
Buda GL6	CI	General Motors 616	Al
Buda BUS	CI	Lycoming TF	Al
Buda BA6	CI	Lycoming TS	Al
Buda HS-6	CI	Lycoming CUWM	CI
Buda DS6	CI	Stearns HU & H	CI
Buda JV-6	CI	Stearns AU, A, AR	CI
Buda JH-6	CI	Stearns DU, D, DR	CI
Buda GF-6	CI	Stearns HR	Dur
Buda DW-6	CI	Stearns DUV6	CI
Buda JV-4	CI	Stearns EUV6	CI
Buda JH-4	CI	Stearns DRV6	Dur
Buda Hivelo H-173	SS	Stearns EU4	CI
Buda Hivelo H-199	SS	Van Bl'k N160SS, 180HS	SS
Buda Hivelo H-260	SS	Van Bl'k N162SS, 182HS	SS
Buda Hivelo H-298	SS	Van Bl'k N164SS, 184HS	SS
Buda Hivelo J-214	...	Van Bl'k N166SS, 186HS	SS
Climax G4A	CI	Wisconsin E	CI
Climax G4B	CI	Wisconsin K	CI
Climax H4A	CI	Wisconsin B-2, B-3	CI
Climax H4B	CI	Autocar ALL	...
Continental B7	CI	Mack ALL	...
Continental 15H	Al	White ALL	...
Continental K4	CI		
Continental L4	CI		
Continental B5	CI		
Continental S10	NI		
Continental H24	CI		
Continental H28	CI		
Continental 16H	Als		
Cyclone C4	SS		
Cyclone C4	SS		
General Motors Y&YZ	CI		

From "American Stock Engines." Statistical Issue, *Automotive Industries*, Feb. 28, 1931

Al—Aluminum alloy.

Als—Aluminum with steel strut.

CI—Cast Iron.

Dur—Duralumin

SS—Semi Steel.

# JUST AMONG OURSELVES

WE'VE just finished "Onward Industry." You will recall that this is the voluminous discussion of "The Principles of Organization and Their Significance to Modern Industry," recently written by J. D. Mooney and Alan C. Reiley.

Complete word by word reading of this long volume will do for thoughtful managers everywhere in the industry something of what Wells' "Outline of History" did for many in its field. No high spot reading nor perusal of excerpts can provide the permanent emotional and mental penetration in this case that full, careful reading will give.

But for those interested in the general concept of the book, but who lack the time or the perseverance to dig through its pages, the authors, or someone else, would be doing a great service to automotive executives should they lift from its pages and present in the form of short essays on business the hundreds of stirring, brief discussions of specific points which the book contains.

Just to see if you don't agree with this idea, we're going to devote the rest of this page to quotes from this book, selected on this basis. From here on Mr. Mooney and Mr. Reiley are speaking:

tice of "cutting cross lots"; on the negative side it results in the shirking of responsibilities, or, in popular phrase, "passing the buck." Such conditions become aggravated when management itself begins to take short cuts, without proper consideration of the long-time consequences. The two conditions usually go together, for the management that is inattentive to the definition of subordinate functions is almost sure to be just as disorderly in the exercise of its own. True coordination in the formal sense can only be effectuated through functional definition, and such coordination must begin at the top. No one who has ever had personal knowledge of such conditions can question the importance of exact functional definition in its effect on collective morale.

The opposite type of management, which regards the exact definition of every job and every function, in its relation to other jobs and functions, as of first importance, may sometimes appear excessively formalistic, but in its results it is justified by all business experience.

## "Who's to Blame for 'Politics'?"

HOW often do we hear it said of business institutions that their organizations are all "shot through" with politics. A superficial thinker might take this as a reflection on the personnel. If he should become acquainted with this personnel, he might be surprised to find how good, potentially at least, it really is, perhaps comparing not unfavorably with the personnel of other institutions which function smoothly and harmoniously. Ten to one we must go to organization rather than personnel to find the real source of the trouble.

To say that such conditions, when they exist, are usually the fault of management is true, but not sufficiently explicit. They are really due to inattention on the part of the management to the necessities of formal organization, and the application of its principles.

When an employee is placed in a position, with duties ill defined in their relation to other duties, what happens? Naturally, he at-

tempts to make his own definition of these duties, and, where he can, to impose this view on those about him. In this process he encounters others in similar case, with friction and lack of coordinated effort as the inevitable consequences.

On the positive side orderly procedure gives way to the prac-

## "The 'Easy' Boss"

IT is in the correction of weaknesses that the average supervisor fails, if anywhere. It is an old maxim to say that the so-called easy boss is in reality a hard boss. It would be more accurate to say that he is essentially an unjust boss.

In all but his human relations he may be most attentive to his duties. Defects or weaknesses that he will not tolerate in a mechanical product, or in any specific task, he will habitually tolerate in men. Where human

weaknesses exist, he is more apt to allow for them than to attempt their correction.

In this he is merely considering his own ease, even though it involves a denial to his subordinates of the help, encouragement and admonition to which they are entitled.

Injustices of this kind are far more prevalent in business than the positive kind, based on human dislikes and prejudices, a fact which personnel management must always recognize.—N.G.S.

# Miss England II Sinks After Winning Heat for Harmsworth Trophy At

**K**AYE DON, intrepid British speed king, won the first heat of the Harmsworth trophy speedboat races on Sept. 6, only to lose the second test of speed the following day when both he and Gar Wood crossed the starting line too early and were disqualified. His craft, Miss England II, was thrown into the air by the wake of Wood's Miss America IX at the first curve in the Detroit River course and sank.

George Wood, in Miss America VIII, crossed the line starting line cautiously, allowed plenty of way and walked off with the second heat without opposition. The third heat could not be run, since the British contender was badly damaged. The trophy, won by Gar Wood for the first time in 1920, remains in this country for at least another year.

The back of the British speedboat was snapped in two and the daring British pilot of Lord Wakefield's challenger and his two youthful mechanics, Dick Garner and Roy Platford, were hurled out into the Detroit River.

Miss England II's superlative success the day before had given Don assurance. He cut his speed but slightly and then gave the boat the gun a bit too soon. Traveling at a gait well over a mile a

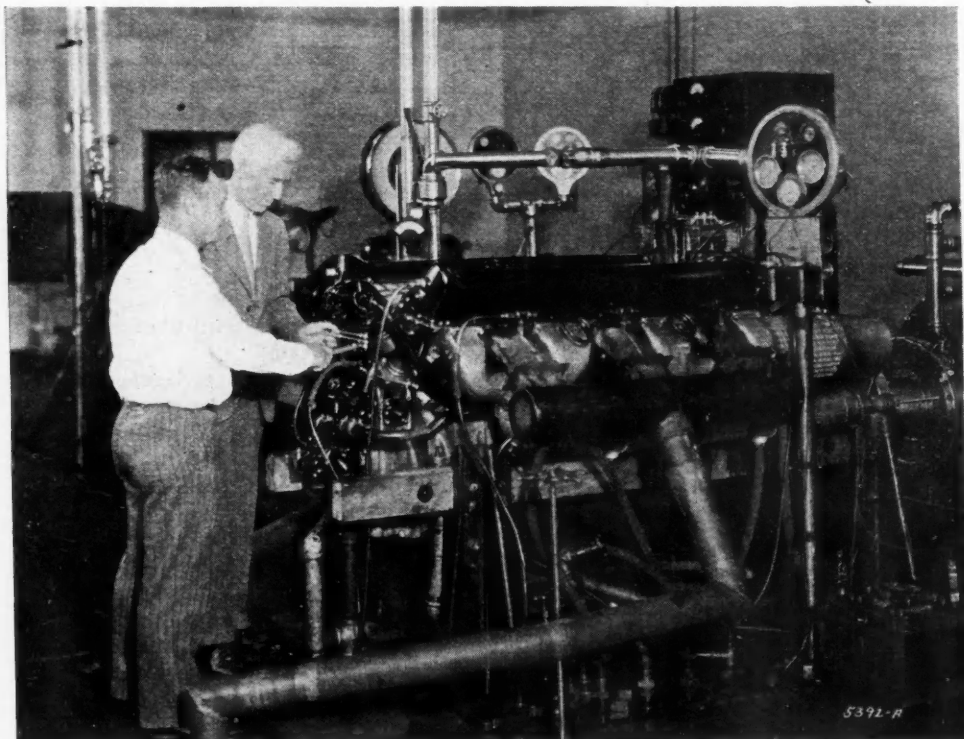
minute, Don met disaster.

Don escaped the fate that had befallen Sir Henry Segrave in the identical boat on Lake Windermere a year ago. Segrave hit a submerged log and was killed, nearly every bone in his body being broken. A somewhat similar accident occurred to Phil Wood and Orlin Johnson, Gar Wood's mechanic, at Venice two years ago when Miss England's wash overturned the American boat, injuring both passengers.

At the time of the mishap Miss America IX was ahead and kept on, oblivious of the near catastrophe behind it. Gar Wood turned the course at an average speed of 91.502 miles per hour before he was waved off.

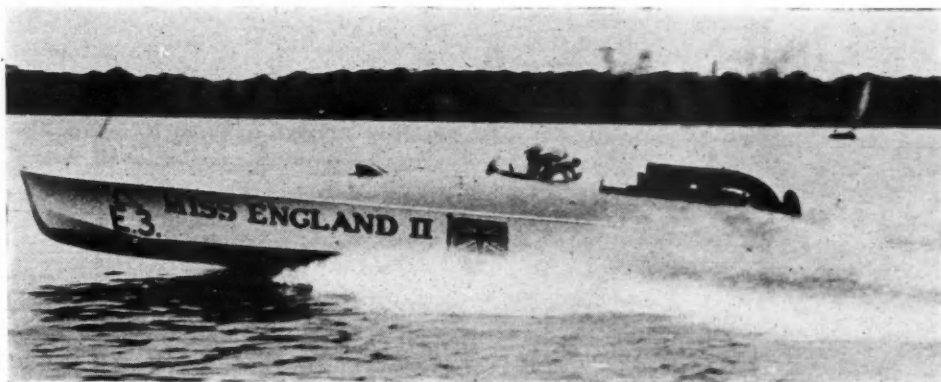
In the first 30-mile heat both Miss England and Miss America IX surpassed all former speed records for a Harmsworth race. It was the first time Wood had been defeated since he won the historic plaque off Cowes, England, in 1920.

Miss England's average for the 30 miles was 89.913 miles an hour, and Miss America IX averaged 87.027. The previous heat record was 77.390 miles an hour. Don's fastest lap was the second, when he averaged 93.017 miles an hour.

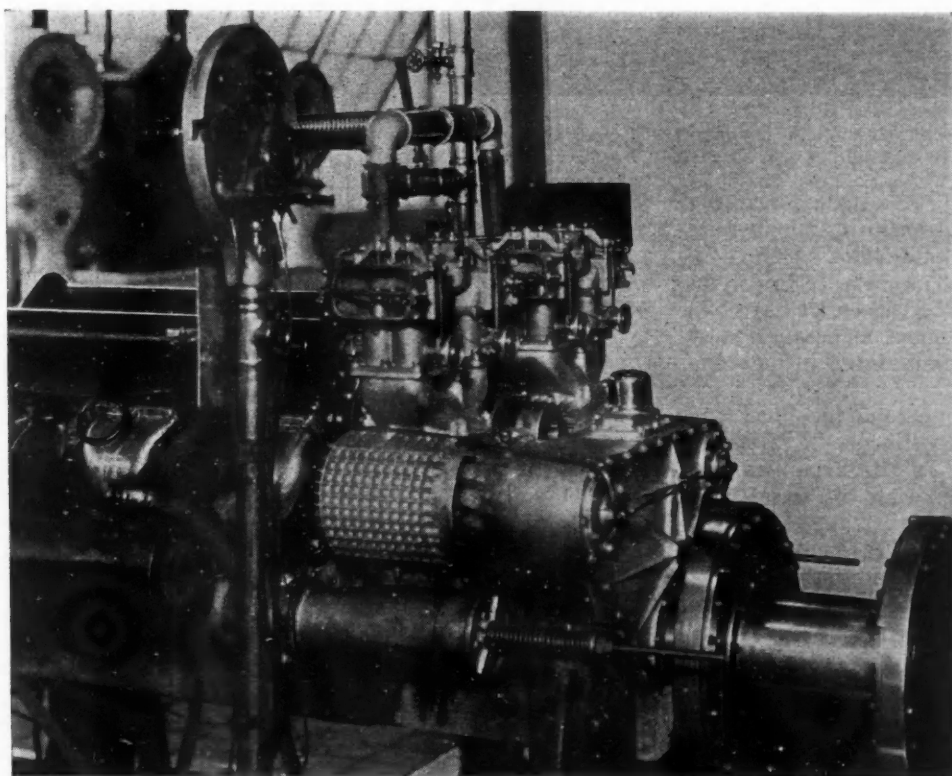


Another view of one of the Packard engines used in Miss America IX. These engines were placed in front of the cockpit and drove two propellers. These engines were originally placed in Miss America VI and have been in two wrecks which sent them to the bottom, once in the St. Clair River and later in the salt water of Venice, Italy. This illustration shows Gar Wood and his mechanic Orlin Johnson watching the engines while they were being tested at the Packard factory prior to the race

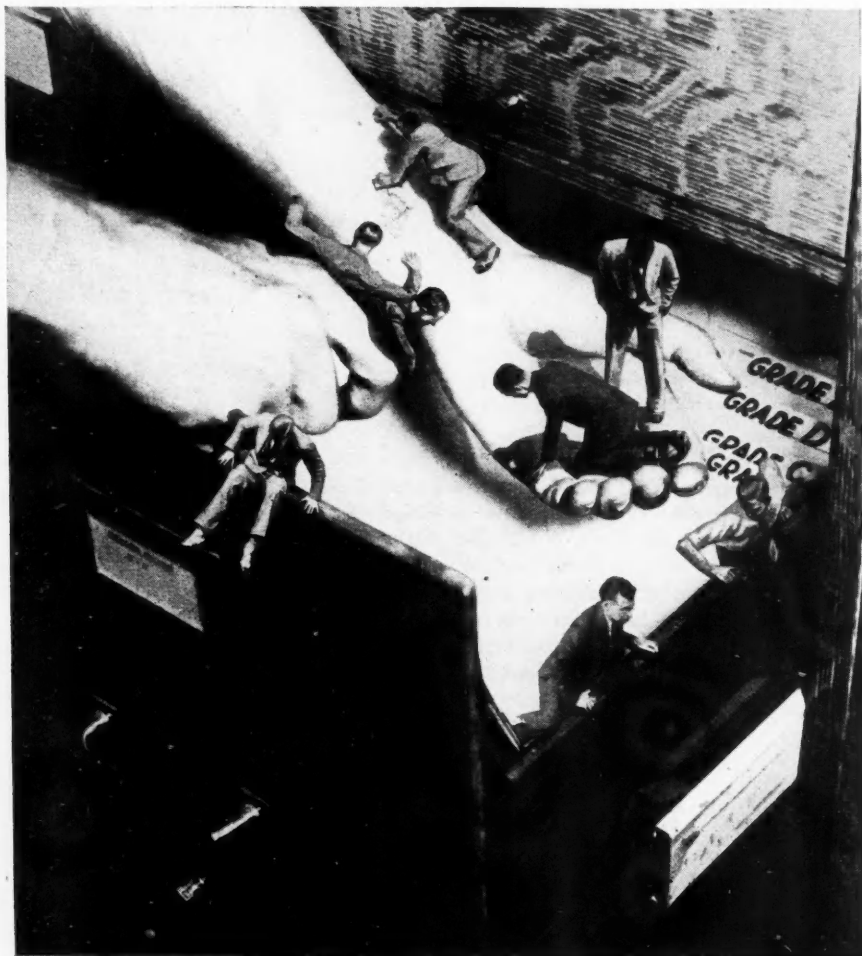
## the First Detroit



Miss England II was powered with two 12-cylinder Rolls-Royce 6 by 6 1/4-in. engines, each having a displacement of 2100 cu. in. and developing 2000 hp. Centrifugal type superchargers were used and the overhead camshafts operated four valves per cylinder. The boat measured 37 ft. from bow to stern with a beam of 10 ft. 6 in. The entire craft with engines, fuel, etc., weighed 11,200 lb., equivalent to 3.56 lb. per hp. Drive from the engines was forward to a gearbox, then the propeller shaft passed aft, to drive the single two-bladed propeller, which was machined from a single billet, 340 hours being required for the machining. One-half hour running at full throttle consumed 150 gal. of fuel. Watford magnetos and K.L.G. plugs were used. Ratio of engine speed to propeller speed was 4 to 1 + + + + + + +



Power on the two Packard engines used in Miss America IX was increased to better than 1400 hp. at 2340 r.p.m. by means of Schwitzer-Cummins superchargers of the Rootes type. These 12-cylinder engines had a bore and stroke of 6 3/8 and 6 1/2 in. respectively, giving a displacement of 2539.5 cu. in. for each engine. Overhead camshafts operated four valves per cylinder. Ten valve springs arranged concentrically were used for each valve. Exhaust valves were oil-cooled. The illustration shows clearly the new superchargers, which are among the largest ever built in the United States



# Industry Knowledge

By Louis Ruthenburg\*

President, Copeland Products, Inc.

of practical economics and of the social sciences, it might have the same effect upon the future of management and industry that the discovery of the Rosetti Stone had in opening to us a knowledge of Egyptian hieroglyphics. This one discovery allowed historians to open the pages of four thousand years of history that had been sealed for centuries.

As I have pondered this problem it has occurred to me that possibly there is such a common denominator.

There are in this world, thank the Lord, certain fundamental relationships that cannot be repealed or amended by human legislation. These relationships have existed since time began, and will continue to control all activity until time shall cease.

A story is told concerning the Indiana State Legislature, and it is not difficult to believe of any one of several State Legislatures. A representative from one of the hill districts introduced a bill which stated that, "whereas the usually accepted relationship between the diameter and circumference of a circle, namely pi, or 3.1416, was a mean figure to remember and an awkward one to figure, be it enacted that henceforth that relationship shall be an even '3'."

There is a simple example of a relationship that cannot be changed by legislation.

But we are not vitally concerned with static things. We are concerned with things in motion. Let's have a brief look at the science of dynamics. It is a peculiarly happy and significant fact that the name of this organization should be the "Dynamic Club." For our present purpose, dynamics may be defined as that branch of science which deals with matter in motion, and I firmly believe that if we can grasp a few of the fundamental lays of dynamics as a basis for management training, the philosophies that have to do with money and people and the technical elements of our jobs will be simplified and made clear. Let's think in terms of human motivations and of money in motion.

The law of action and reaction, simply expressed as

**G**OOD management is predicated upon a working knowledge of money relationships, human relationships and technical knowledge.

This trilogy is of fundamental importance in directing any industrial enterprise. The reason we have had so much badly balanced management is because most managers have spent a long time training in only one kind of knowledge.

A man trained exclusively along some technical line is apt to have little patience with people, because human beings do not react to definite formulae and rules of practice like his mathematics, tool steels and chemicals.

And, by the same token, because a salesman has little patience with the precision and tedium of figures and technical problems, he is likely to fail to see the important part this phase of business plays in success.

Today industry suffers because serious problems themselves cannot be changed to fit the specialized knowledge and experience of management which has been carefully trained in some single phase of business.

If the increasingly complicated industrial problems of the present and future are to be dealt with effectively, management simply must be so trained as to take into account the several important basic factors at proper evaluation.

If one could find some common denominator, the problems of management-learning and management-training would be greatly simplified. If a basic philosophy could be found which would in turn clarify the study

\*Excerpts from an address before the Dynamic Club, University of Detroit.

# Suffers From the Specialized and Experience of Management

"every action is followed by an equal and oppositely directed reaction," is a fundamental relationship which can bring the money, human and technical factors of management into being as an entity.

This is simply demonstrated by the fact that unfair treatment of labor is followed by retaliatory measures on the part of labor. The Golden Rule, an inferential expression of the law of action and reaction, will go a long way toward bringing the trilogy of philosophies of management into a workable tool for successful direction of business enterprises.

There is a certain formula in dynamics which deals with the vibrations of a spring in its return to a state of rest after it has been released from stress. An understanding of this principle will shed a lot of light upon the current world depression, the boom of 1923-29, the depression of 1920-21 and the boom of 1919. The whole fabric of the world was tremendously stressed as a result of the World War, and conditions may reasonably be expected to oscillate from abnormal to sub-normal until that stress has spent itself, or until oscillations have been modified by other forces.

Then there is the law of diminishing return which usually is claimed by the economists as one of their laws. It is no more a law of economics in the exclusive sense than it is a law of dynamics or of human behavior.

The first savage who observed that he expended disproportionately more energy to run eight miles an hour than he used in walking four miles per hour was conscious of the law of diminishing return. It operates in all fields of activity, and knowledge of its operation clarifies many otherwise involved problems in monetary matters and human relationships.

Another of the very fundamental dynamic laws has to do with energy being the product of mass and velocity. The student of elementary dynamics will recognize the formula  $\frac{1}{2} MV^2$  as a fundamental energy relationship. A rifle bullet weighing a few grams, propelled at the relatively high velocity imparted in a modern firearm, will release more energy upon impact than a slow-moving motor truck weighing several tons. In the bombardment of radium, we have projectiles of very small mass releasing terrific amounts of energy upon impact because of the extremely high velocity at which they move.

An understanding of this relationship will assist greatly in understanding prosperity and depression.

Two friends of mine were talking about the current depression. Said the Sales Counselor, "Why should we have a depression? Look at the money in the banks. Savings accounts increasing. Lots of gold. Look at the supply of commodities. Look at prices—lower than they've been in 20 years. What's the answer?" Then spoke the Engineer, "If I should take you down to the railroad yard and pick out a standing locomotive and say, 'Look, there's an engine that yesterday pulled the Detroit from here to New York in 14 hours. It weighs just as much as it did yester-

day. Why isn't it going any place?', what would you say?"

"If I didn't know you," replied the Sales Counselor, "I'd say you were a bit balmy. But knowing you as I do, I pause for enlightenment."

"Well," continued the Engineer, "it seems to me that your statistics about wealth represent simply a mass figure like the weight of that locomotive. Wealth *in motion* is a measure of prosperity just as mass times velocity squared is a measure of the work done by that locomotive. Giving you the weight of a locomotive doesn't give you any knowledge of its ability to go places, and your telling me about the mass *only* of the nation's wealth means nothing to me nor anyone else as a measure of prosperity. Your mass of wealth has lost velocity and if it continues to lose velocity, you can have many times as much *static wealth* and it won't mean a thing as far as prosperity is concerned."

Here's another interesting and basic physical relationship that helps us to understand many human problems. A substance which recedes before impact will outlast many times a material which resists it. You know that your rubber tires will run for many weeks and for thousands of miles without appreciable wear. You also know that if you put a pair of hard, steel anti-skid chains on your tires the relatively hard steel will be completely worn out in a few miles. I have seen soft rubber sand blast nozzles outlive nozzles of chilled iron. A friend of mine substituted soft rubber for the hardest manganese iron in centrifugal pump bodies which were subject to the terrific abrasive action of

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## Training for management requires:

1. Study, practice and acquisition of fundamental characteristics of leadership.
  2. Critical reading of the biographies of recognized leaders.
  3. A balanced perception of money matters and human relationships in addition to technical knowledge.
  4. A comprehensive and intimate knowledge of fundamental physical relationships to be learned and directly applied to the human, economic and technical problems of management.
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# Engines and Propellers Were Topics Aeronautic Meeting of the S. A. E.

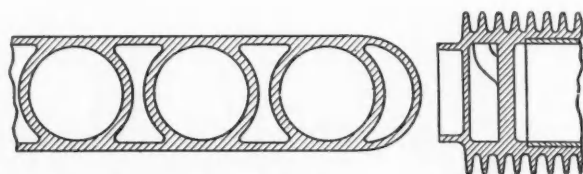
## Cleveland Sessions Were Held During the National Air Race

SOME refinements of engine practice—cooling and supercharging fuel injections, instrumentation and the use of special alloys in aircraft construction—took the major part of the time of the two engine sessions of the National Aeronautic Meeting, Society of Automotive Engineers, which was held in Cleveland last week (Sept. 1-3) in connection with the National Air Races.

A single session on propellers was devoted more to a general survey of the field, with one paper on "Controllable and Automatic Aircraft Propellers" and one on "Aeronautic Propellers." The two aircraft sessions covered five papers, including a summary of European technical progress by Lieut. Alford J. Williams, who recently returned from Europe, where he acted as a representative of the National Air Races in inviting foreign pilots to participate in the events.

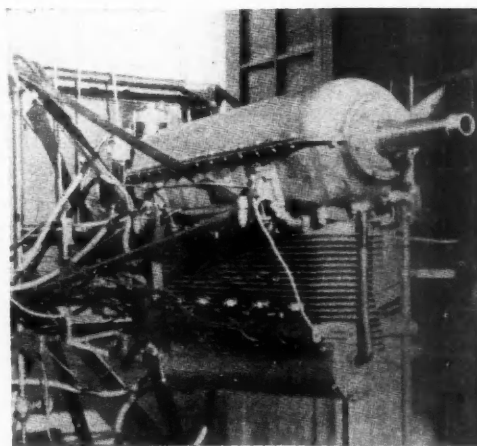
At the completion of the three-day technical program (which appears in full herewith) there was held a "Dutch supper," at which David S. Ingalls, assistant secretary of the Navy for aeronautics, was toastmaster, and Lowell Thomas, radio headliner and author, the program speaker.

"Sealed liquid-cooling" was discussed in the first paper which was presented by J. H. Geisse, vice-president of engineering of the Comet Engine Corp. Mr. Geisse, who was formerly connected with the Naval Aircraft Factory in Philadelphia, related the experience of both the Army and Navy with high boiling-point cooling liquids when production of ethylene glycol was first begun. The air services were interested in this liquid particularly because it had a very high boiling point, which under conditions of an extreme atmospheric temperature of 100 deg. Fahr. permitted of more than twice the mean temperature difference between the radiator and the atmosphere that exists with water cooling, and therefore seemed to make it possible to cut the required radiator surface in half.



Section through cylinder block of experimental engine

In the Navy tests, which were carried out mainly on a torque stand with the engine exposed to the slip stream of the propeller, it was found that a great deal of the heat loss was taken care of by direct radiation. Using a Wright E-4 engine, the radiator was progressively decreased and the temperature allowed to rise beyond the optimum from the standpoint of power



Six-cylinder, inverted-in-line, semi-air-cooled aircraft engine which was developed by the Comet Engine Corp.

developed and fuel consumption. Finally the radiator was taken out of the line entirely and a short run was made with all of the heat dissipated from the jacket walls and the length of pipe connecting the inlet and outlet. The results were quite promising.

Later the Comet Engine Corp. submitted to the Navy designs of an engine embodying the new system of cooling, in which some of the difficulties experienced with high-temperature cooling in engines designed for water-cooling had been provided against, and a contract was given the corporation for an experimental unit.

This engine, which is fully described in the paper, is a six-cylinder, inverted-in-line engine of 4 $\frac{3}{8}$  in. bore by 5 $\frac{1}{8}$  in. stroke. It has dry sleeves and therefore no joints through which the liquid could get into the inside of the cylinders. As may be seen from the accompanying drawing, the liquid does not completely

# of Discussion at the National

surround each cylinder, direct air-cooling being provided for the thrust and anti-thrust sides, which has the advantage that the amount of liquid to be carried is considerably reduced. To permit fore-and-aft circulation of the liquid, and thus equalize cylinder temperatures, passages are provided past the cylinder walls on both sides near the top, and the jacket space below the cylinder heads, which is open from end to end, provides the return passage.

Jackets, after being filled with coolant, are completely sealed from the atmosphere, except for the provision of a relief valve. When the engine is first heated up, some of the coolant is discharged, and upon cooling of the engine a partial vacuum is formed in the jackets. Sealing the jacket prevents absorption of water by the coolant, which is extremely hygroscopic. The design is very favorable to thermo-siphon circulation, since most of the heat is imparted to the liquid near the cylinder head, at the bottom.

To minimize head resistance, the cylinder block was made as clean as possible, by casting the inlet manifold in the block and placing all accessories behind the cylinder block and crankcase. Distribution was found to be satisfactory, which is probably due to the high manifold temperature, but it is believed that the volumetric efficiency is not all that might be desired (the only tests made so far are the acceptance tests). The weight of the engine is 345 lb., including 14 lb. of cooling liquid.

The engine developed 138 b.hp. at 2360 r.p.m., with a fuel consumption of 0.53 lb. p. hp.-hr. The temperature of the liquid in the jacket varied between 380 and 390 deg. Fahr., the maximum cylinder temperature was 405 deg., and cylinder barrel temperatures varied between 295 and 340 deg. In the test a blast of cooling air at 90 m.p.h. was directed against the engine.

In discussing the advantages of the new system of cooling, Mr. Geisse said all of the simplicity of the direct air-cooled engine had been retained, and the necessity of passing the slip stream around each cylinder had been eliminated. Instead of providing cowling and deflectors to get the air in contact with inaccessible surfaces, means were provided for bringing the heat to the air. Even if this were to increase the weight, an overall gain in efficiency of the powerplant would result. The resistance of a radial air-cooled engine with an N.A.C.A. cowling accounts for approximately 10 per cent of the total plane resistance at 125 m.p.h. and this increases to 16 per cent at 150 m.p.h. The resistance of an efficient radiator for water-cooling accounts

for about the same percentages of total plane resistance.

No measurements of the resistance of the engine with the new cooling system have been made, but it has been generally estimated that it will be only slightly greater than one-ninth of a nine-cylinder radial engine of equal bore and stroke with cowling installed.

Mr. Geisse also called attention to the possibilities of the new cooling system for aircraft Diesel engines, which he expects to be further developed chiefly as an in-line and V engines.

## Turbo Supercharger

A paper on The Turbo Supercharger, presented by A. L. Berger and Opie Chenoweth, both of Wright Field, followed Mr. Geisse's presentation. The authors traced the development of this piece of air engine equipment from its first experimental development during the war and made a study of the performance that may be expected, from which they reached the conclusion that it is a satisfactory piece of apparatus for maintaining sea level pressure at the carburetor up to considerable altitudes.

## Fuel Injection and Spark Ignition

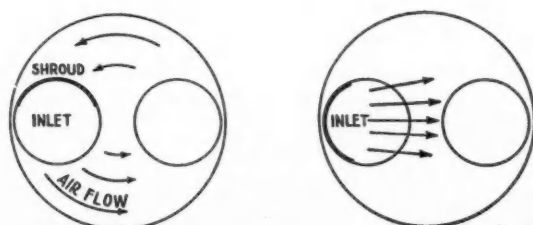
E. S. Taylor and Geo. L. Williams of Massachusetts Institute of Technology offered a paper on Further Investigation of Fuel Injection with Spark Ignition in an Otto-Cycle Engine. In the introductory paragraph it was stated that the experiments were carried out on a Cooperative Fuel Research test engine, which we know to be an Otto or four-cycle engine, but in the fourth paragraph there is reference to modifications made in the injection valve to meet the requirements of a two-cycle engine, and in the remainder of the paper reference is made only to two-cycle operation.

In the early stages of the investigation it was found that with late injection the action of the engine was erratic, and that this could be cured only by directional turbulence. Hence the inlet valve was provided with a shroud, as used by a number of foreign manufacturers of oil engines.

It was found that with injection timings suitable for application to two-cycle engines, that is, injection after the closing of the inlet valve, better power and better fuel economy may be obtained than is possible with either early injection into the inlet pipe or with a conventional carburetor.

Gasoline or hydrogenated fuels of low volatility may be used in this application with equally good performance. The possibility of using hydrogenated fuels of low volatility but high anti-knock value is especially promising.

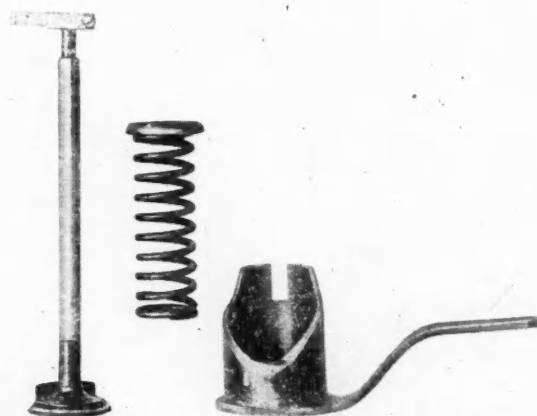
In practically all of the fuel spray tests made for the N.A.C.A. at Langley Memorial Laboratory in the past, the air into which the fuel was sprayed was at



Type of air flow obtained for extreme positions of shroud

atmospheric temperature, and in this respect the tests did not conform to actual conditions in an oil engine. It was therefore decided to design an apparatus that permits of injecting the fuel into air heated by adiabatic compression, and to take photos of the spray under these conditions, as well as of the ensuing flame. This apparatus was dealt with in a paper on The Development of an Apparatus for the Study of Combustion in High-Speed Diesel Engines, by A. M. Rothrock, associate physicist of the N.A.C.A.

The combustion chamber of the engine used in the tests is vertical in the cylinder head and has a diameter of 3 in. and a depth of  $\frac{7}{8}$  in. This shape was chosen because it permitted the two sides of the chamber to be made of glass disks. There are two 1-in. thick



Shrouded valve with means for varying angular position of shroud + + +

windows on each side of the chamber, separated by an airspace which is connected to a tank of compressed air. Since air temperatures of 2000—3000 deg. Fahr. abs. and pressures in excess of 800 lb. p. sq. in. are reached in the combustion chamber, the conditions to which the inner windows are exposed are extremely severe. By maintaining an air pressure of about 450 lb. p. sq. in. between the windows, the stress is divided between the inner and outer windows. The combustion chamber is connected to the displacement volume by a rectangular orifice of 0.695 sq. in. area, to produce air flow in the chamber.

The cylinder dimensions are 5 by 7 in., and the compression ratio is 15.8:1. At the bottom of the stroke the piston uncovers ports in the cylinder wall, connected to a cam-operated poppet valve that opens when the piston is at the bottom of the stroke. Through this port and valve, air enters the displacement volume and makes up for any leakage past the piston rings. The inlet manifold also may be connected to an air compressor, so that the effect of increased air density on the fuel spray and on the combustion may be studied.

Jacket spaces of the combustion chamber and the cylinder are connected to an electrically heated tank containing glycerine. By means of this liquid, temperatures of 500 deg. Fahr. can be maintained in the jackets. The glycerine is circulated by a pump.

One end of the crankshaft is connected to the electric motor, and the other end to the timing gear through which the injection system is driven. The

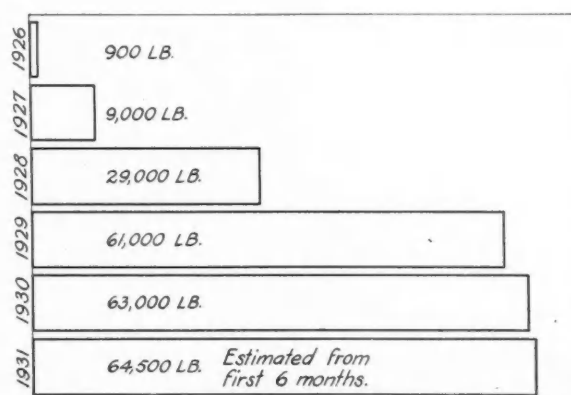
timing gear is calibrated so that the start of injection can be varied in increments of one crankshaft degree. The shaft connecting the timing gear to the injection system is operated by a clutch similar to those employed on press punches. When this clutch is engaged the camshaft of the injection system makes a single revolution at a speed of one-half crankshaft speed. The injection system is the same type as that used on the N.A.C.A. spray photography equipment.

Photographs of the sprays in the combustion chamber are taken by means of the same high-speed photographic apparatus which has been used in previous spray investigations. The light is obtained from sparks produced by successive discharges of high-voltage condensers, effected by means of a rotary switch operated by the engine. Sparks are produced at the rate of 2000 per sec., and this is the rate at which photos are taken.

In a preliminary series of tests with this new equipment the effect of high temperatures on the fuel spray was studied. The penetration of the spray tips was slightly decreased in the hot air, and the air temperature caused the fuel to disperse throughout the chamber to a greater extent than with injection into the air at room temperature. In the cold air, after the cut-off of injection, the spray diffused slowly throughout the chamber but at all times light was transmitted through the chamber. With injection into the hot air the spray completely blocked out the light after 0.004 second. Injection cut-off occurred at approximately 0.0038 second. Mr. Rothrock says: "The photographs show that observations of fuel sprays obtained in air at room temperature but at a density corresponding to that in the combustion chamber of a compression-ignition engine, yield information on the spray characteristics applicable to engine conditions."

## Magnesium Alloys

"Magnesium Alloys in Aircraft-Engine Construction" was the title of a paper presented by G. D. Welty of the Aluminum Co. of America. Mr. Welty said the AM7.4 alloy, which is the casting alloy of magnesium used by practically all foundries (7 per cent aluminum, 0.4 per cent manganese, rest magnesium) is equal to the corresponding aluminum alloy in tensile strength, somewhat inferior in yield point, but rather better in elongation. Its Brinell hardness is 50 and its modulus of elasticity, 6,500,000, as com-



Showing use of magnesium in aircraft 1926-1931

pared with 75 and 10,000,000 for aluminum. In fatigue resistance, however, it is distinctly superior to aluminum. In some cases it is necessary to increase the section 15 per cent to obtain the same stiffness as with aluminum.

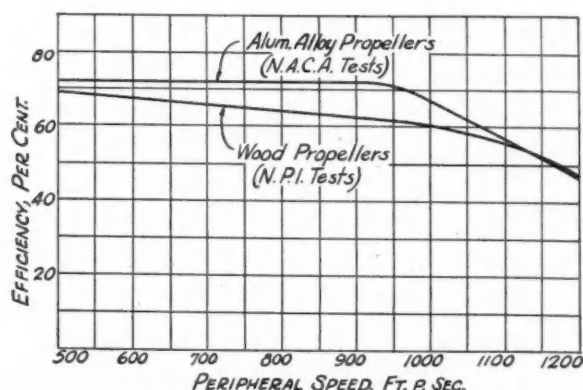
Much progress has been made recently in producing magnesium alloy forgings. An alloy known as 61S is commonly used for this purpose. Large bearing surfaces with low unit pressures are indicated when parts are bolted together. Liberal sized bosses should be provided for studs, which should not be driven too near a hole or an unsupported edge. As a connecting rod material magnesium forgings do not hold much promise, but for propeller blades the picture is much brighter. Quite a number of magnesium propellers have been tested with very promising results. The low density of the material coupled with its high endurance limit gives a desirable combination of properties.

## Automatic Air Propellers

In their paper on Controllable and Automatic Air Propellers, D. A. Dickey and Lieut. O. R. Cook of Wright Field pointed out that although a number of articles have appeared extolling the merits of controllable, adjustable or variable-pitch propellers, a visit to air fields reveals very few such propellers. All controllable and automatic propellers are still in the experimental stage, and those engaged in their development naturally hesitate to publish details.

"There is no shortage in ideas as to how the pitch of a propeller may be changed in flight. It is not the lack of a method that is keeping controllables away from the flyers. The biggest stumbling block seems to be the lack of materials light enough in weight and of sufficient strength to permit the designer to get the propeller within the weight and space limitations established to date," the paper stated.

At the present time the Material Division of the Air Corps is following the development of eight distinct types of controllable and automatic propellers, including one designed in the division. The Air Corps is aiding in the development of such propellers as show promise of being of use in military service by conducting tests on them, thus relieving the inventors of this expense.

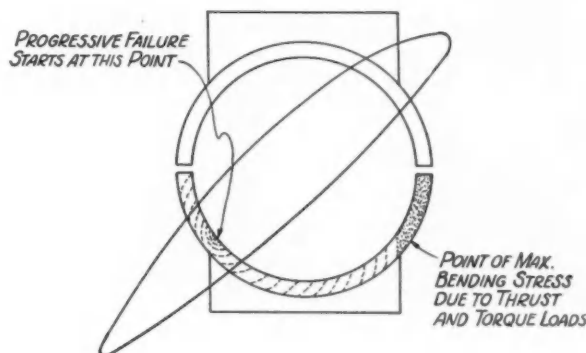


Loss of propeller efficiency  
at high speeds + + +

## Aeronautic Propeller Design

Frank W. Caldwell, vice-president and chief engineer of the Hamilton Standard Propeller Corp., discussed Aeronautic Propeller Design in a paper of that title. He stated that the loss in efficiency of propellers, which formerly was thought to begin only when tip speeds close to the velocity of sound are reached, has been shown by recent experience to begin for aluminum-alloy propellers at approximately 950 ft. p. s. and to amount to about 10 per cent for each additional 100 ft. p. s. According to British research on wooden propellers the loss in efficiency begins at 700 ft. p. s., the difference between the aluminum alloy and wood propellers in this respect being due to the thinner sections used with the former.

Mr. Caldwell also discussed different forms of vibration of propeller blades. Blade flutter, which is a form of torsional vibration, is now well understood and can be guarded against in the design. There is, however,



Showing localization of stress in propeller root

a form of vibration of the blades in the plane of rotation which has given considerable trouble. Whether it is forced vibration resulting from cylinder impulses, or free vibration due to resonance, is not known. It tends to produce failure at the roots of the blades or in the hub. Resistance of propellers to the stresses due to such vibration is now determined by an accelerated test in a vibrating machine.

Aluminum alloy propellers have been refined in design chiefly by eliminating points of stress concentration, which lead to progressive failure under the influence of vibration.

Magnesium alloys are rapidly being improved and hold out considerable promise as propeller materials, particularly as materials for variable-pitch propellers, since the reduction of blade weight in these designs leads to a reduction in bearing loads due to centrifugal forces.

Several methods of manufacturing hollow steel propellers are under development at the present time, and the Hamilton corporation is developing a process of manufacture from steel tubes. Such propellers seem to offer particular advantages from the weight standpoint for diameters in excess of 13 ft.

# Dominion Motors Bids for Canadian Sales With New Frontenac Six—



Count Frontenac et Palluau, a colorful character of Canadian history for whom the new Dominion Motor Line is named + +

**O**NE hundred and fifty Frontenac Six automobiles were driven from the Dominion Motors, Ltd., Leaside, Toronto, plant on Sept. 3, initiating a new name in the automotive industry.

The car is named after one of Canada's most eminent governors, Louis de Baude, Count Frontenac et Palluau, who took post by appointment of the French king on Sept. 12, 1672.

Dominion Motors, successor to Durant of Canada, Ltd., is producing the Frontenac Six at \$975 and \$1,097, for the Special and De Luxe sedans, respectively. The powerplant is a Continental Red Seal engine of the detachable L-head type.

Selective free wheeling is supplied for \$35 extra on the Special models, and is included in the price for the De Luxe. Automatic starting is supplied optionally for \$15 extra on the Special model, and as standard equipment on the De Luxe type.

The car has a double drop frame, permitting of a low-slung body effect, accentuated by the rakish lines of a V-type radiator, sloping windshield, trim visor and sweeping lines of the fenders.

The engine has a bore of  $3\frac{1}{4}$  in., and stroke of 4 in., giving it a displacement of 199 cu. in. The compression ratio is 5.32. Maximum torque is 144 ft. lb. at 1300 r.p.m. Taxable horsepower is 25.4.

Engine cast in block  
 $3\frac{1}{4}$  in. bore  
 4 in. stroke  
 199 cu. in. displacement  
 Compression ratio 5.32  
 Gear ratio 4.4 to 1  
 Forced feed lubrication  
 Single plate clutch with dry disk  
 Semi-floating rear axle  
 V-type radiator  
 Tires 19 x 4.75  
 Steeldraulic brakes  
 Automatic starting  
 Free Wheeling

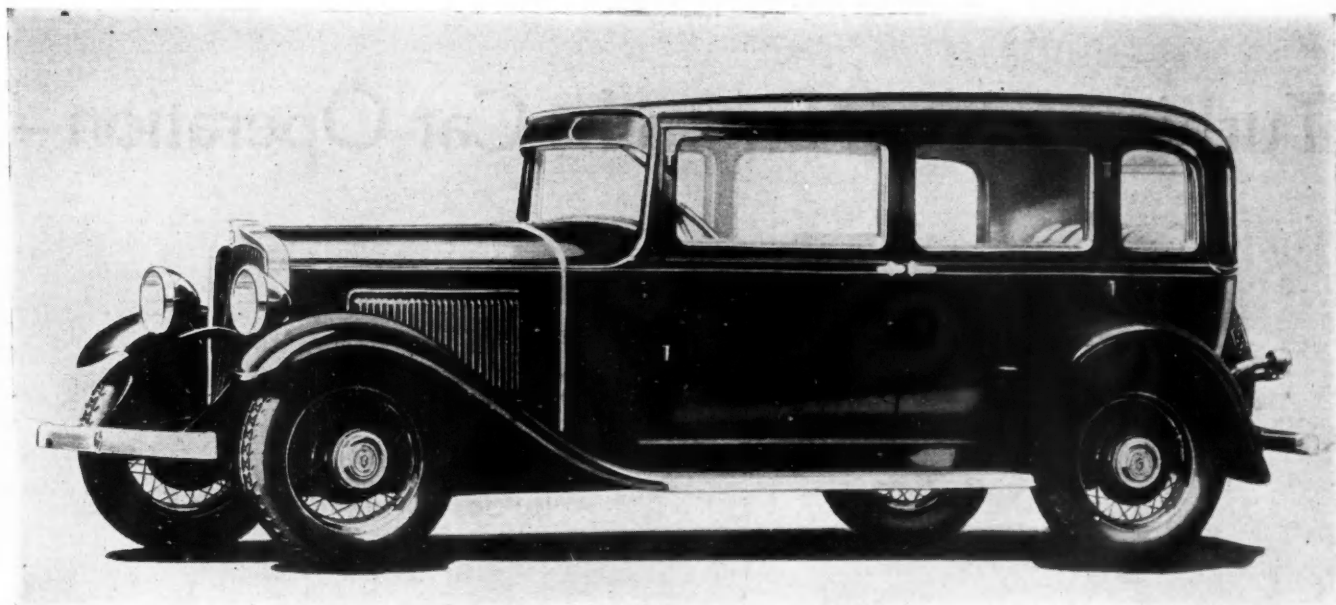
The cylinders are cast in block with upper half of crankcase. Intake valves are  $1\frac{9}{16}$  in. and the exhaust valves are  $1\frac{7}{16}$  in. The valve lift is  $\frac{11}{32}$  in.

Front crankshaft bearings are  $2\frac{3}{8}$  in. x  $1\frac{7}{16}$  in. The two intermediate crankshaft bearings are  $2\frac{3}{8}$  in. x  $1\frac{9}{16}$  in. The rear crankshaft bearing is  $2\frac{3}{8}$  in. x  $1\frac{7}{8}$  in. All bearings are of the bronze back type, babbitt lined, interchangeable and use no shims. A torsional vibration damper is on the crankshaft.

Front camshaft bearings are  $2\frac{1}{16}$  diam. x  $1\frac{7}{32}$  in. The intermediate front bearing is 2 in. diam. x  $\frac{3}{4}$  in. The intermediate rear is  $1\frac{15}{16}$  in. diam. x  $\frac{3}{4}$  in. The rear bearing is  $1\frac{1}{8}$  in. diam. x 1 in.

A centrifugal pump circulates the coolant and the radiator capacity is  $11\frac{2}{3}$  qt.

Force feed is used to lubricate the main engine bearings, connecting rod and camshaft bearings. A gear type pump is used and the engine is fitted with an oil filter. The chassis is lubricated by Zerk fittings. The gasoline tank is of 10 gal. capacity and the car



The Frontenac sedan is offered in Canada at \$975 for the Special Six and \$1,097 for the De Luxe. Free wheeling is \$35 extra

has a  $1\frac{3}{4}$  in. carburetor. An air cleaner is installed.

A single plate type of clutch, with dry disk, is inclosed in the flywheel. Selective sliding gear-type transmission with three speeds forward is unit mounted with the engine.

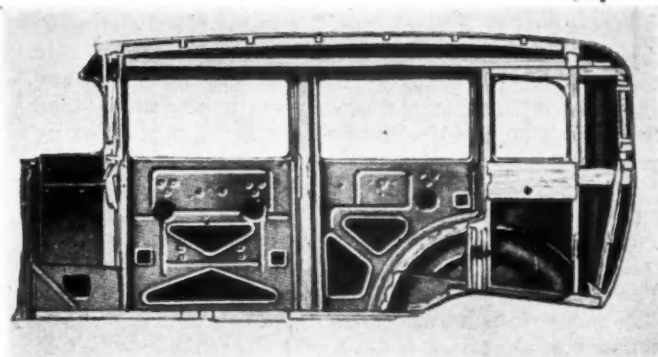
The frame is of double-drop, pressed steel channel section design with extra deep and wide upper and lower flanges. The turning circle in either direction is 38 ft. The car is equipped with a standard drop-forged I-beam front axle, with reverse Elliott-type steering mechanism. Tapered roller wheel bearings and ball thrust bearings are used on the steering knuckle king-pins. It is designed with semi-floating rear axle, spiral ring and pinion, tapered roller bearings throughout. The gear ratio is 4.4 to 1. Midland steeldraulic brakes on all four wheels are of 11 in. diameter and are  $1\frac{1}{2}$  in. wide.

Semi-elliptic front springs are 36 in. long and  $1\frac{3}{4}$  in. wide. The rear springs are  $54\frac{1}{4}$  in. long and  $1\frac{3}{4}$  in. wide. Four wood wheels and spare rim are standard equipment; optional equipment, five wire wheels. The tire size is 19 x 4.75 balloon.

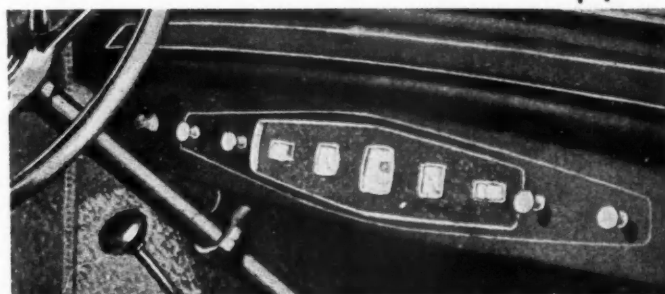
Electric Auto-Lite starting and lighting systems and Presto-Lite battery form the electrical system.

Standard equipment includes temperature indicator; gasoline gage; speedometer; ammeter; oil gage; pull controls for spark, throttle and choke; coincidental ignition and coil lock; foot-operated headlight control; rear view mirror; automatic windshield wiper; hydraulic two-way shock absorbers; air cleaner; oil filter. Equipment does not include front and rear bumpers. All bright finished exterior hardware chromium plated.

The sedan is available with De Luxe equipment at additional cost. The five-passenger sedan with wood wheels weighs 2711 lb.; with five wire wheels, 2756 lb. (shipping weight).



Box truss construction of the body is used to assure strength and rigidity + +



The instrument board is of crackled bronze effect, indirectly lighted, and has the gages grouped under a glass panel + + +

Dominion Motors, Ltd., was chartered on March 14, 1931, to acquire the assets and stock of Durant Motors of Canada, Ltd. The terms of the charter were approved later by stockholders, and Roy D. Kerby, former head of the Canadian Durant interests, became president + + + + +

# Turbine Clutch Smooths Car Operation—

Familiarity with this new mechanism is fast becoming necessary to automotive engineers

by Joseph Jandasek, M.E., E.E.

THE increasing interest in turbine power transmitters makes it necessary for automotive engineers to familiarize themselves with this subject. In this article I have made an effort to illustrate and explain the fundamental theory of turbo-clutches and to furnish some information in reference to existing patents.

This new turbo-mechanism is a combination of a pump impeller and a turbine runner forming a slipping clutch, through which torque and energy from a high-speed engine or other prime mover can be transmitted. The principle of the device is illustrated in Fig. 1. The pump impeller  $A'$ , mounted on a driving shaft, delivers fluid (oil or water) into the turbine wheel  $B'$  mounted on a driven shaft. The fluid leaving the runner  $B'$  enters the impeller  $A'$  again directly, so that it circulates through the system again and again. The fluid set in rotary motion by the impeller impinges against vanes on the runner, passing directly from the vanes of the impeller to the vanes of the runner; the torque on the driven shaft is at all times the same as that of the engine.

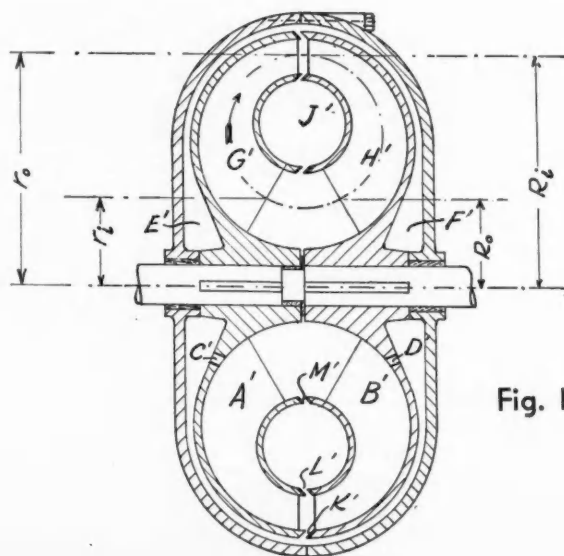


Fig. 1

Fig. 2 illustrates a two-stage turbo-clutch equipped with two impellers,  $I'$  and  $I''$ , and having two runners,  $R'$  and  $R''$ , working in series. Multi-stage turbo-clutches are capable of transmitting greater torque and power for the same clutch volume and at the same rotating speed.

The arrangement whereby fluid passes from an impeller directly into a runner is due to H. Foettinger (U. S. patents Nos. 1,199,359 to 1,199,364). Instead of converting the fluid velocity due to the impeller into pressure and then releasing the fluid so that it may escape at high velocity to act on the blades of a turbine, Foettinger secured the main object of his invention by so juxtaposing the impeller and the runner, that the velocity is entirely maintained without intermediate conversion into pressure, and the kinetic energy is immediately utilized for driving purposes. It is known that it is the conversion of velocity into pressure that is responsible for the greater part of the losses in centrifugal pumps and compressors. Whereas the highest efficiency obtained in modern types of centrifugal pump is only about 85 per cent, in a turbine transmitter an efficiency of up to 98 per cent may be obtained, owing to this direct utilization of the fluid forces.

The device is utilizable and suitable for the highest powers and the highest speeds of revolution; in addition to this the apparatus is easy to manufacture and assemble, and it is durable. Foettinger's transmitter was used originally for marine purposes; for details of construction and further information see *Engineering*, Aug. 15, 1913, or *The Engineer*, July 7, 1922.\*

The turbine clutch, when used for automotive purposes, must be combined with a gear transmission in order to obtain higher torque or reverse speed. As already mentioned in *Automotive Industries*, the Daimler Motor Co. uses a turbo-clutch in connection with a planetary gear transmission, while in America an experimental apparatus was built which uses a combination of turbo-clutch with an automobile mechanical clutch for gear changing purposes (see Fig. 3). There is little probability, however, that the American public would accept a planetary transmission, unless the design were entirely different from that used in the past.

In reference to the patent situation, the following

\* *Engineering* of July 3, 1931, describes such a clutch of 50,000-hp. capacity, with a shaft diameter of 20 in.—Editor.

# Reduces Stresses and Fatigue Failures

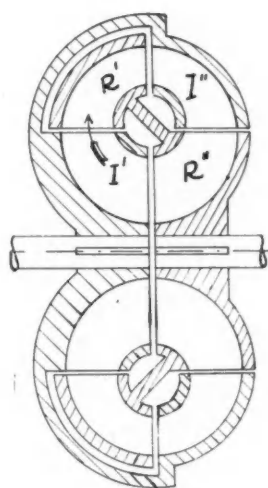


Fig. 2

U. S. patents are of importance:

Radcliffe: Nos. 1,121,397, 1,203,265, 1,576,996.

Klimek: Nos. 1,711,095, 1,689,244, 1,689,245, 1,640,608.

Besides other things, the above patents of Radcliffe cover the following: Patent No. 1,121,397 represents a combination of a turbo-clutch with a radiator, the radiator being intended to cool the working liquid of the clutch. Patent No. 1,203,265 illustrates a turbine clutch with gearing connecting driving and driven members.

Apparatus described in patent No. 1,576,996 is similar to that shown in Fig. 3, this being a very important patent.

Patents to Klimek cover the following among other items: Patent No. 1,711,095 illustrates the combination of a turbo-clutch, a mechanical clutch and a planetary gear. Patent No. 1,689,244 represents another combination of turbine power transmitter and a mechanical clutch arranged in series. A device described in patent No. 1,689,245 is again a combination of a turbine power transmitter with a mechanical clutch in series, the mechanical clutch being located between the engine flywheel and the transmitter. Patent No. 1,640,608 describes a turbo-clutch using as the operating liquid a lubricating oil which is employed also for lubricating the main bearings of the engine, etc., whose power is being transmitted.

Other patents of importance are German patent No. 332,927 and Swiss patent No. 94,287, because these claim adjustable blades, which are of great advantage when speeds are variable.

The above is only a brief indication of the subjects of the various patents, and to learn the scope of each, the patent specifications themselves must be studied.

## Theory

The following notation will be employed (see Figs. 4 to 8): For the impeller:

$v$  = absolute velocity of working liquid,  
 $w$  = velocity of liquid relative to impeller,  
 $u$  = linear velocity of a point of the impeller,  
 $r$  = radius to any point from the axis of rotation,  
 $\alpha$  = angle between  $v_1$  and  $u_1$  at entrance,  
 $\beta$  = vane angle at entrance, i.e., angle between

$w_1$  and  $-u_1$ ,

$\gamma$  = vane angle at outlet, i.e., angle between  $w_o$  and  $-u_o$ ,

$\delta$  = angle between  $v_o$  and  $u_o$  at outlet,

$s$  = tangential component of absolute velocity  $v$

$s_1 = v_1 \cos \alpha$  (at inlet) (1)

or:  $s_o = v_o \cos \delta$  (at outlet) (1a)

$f$  = radial velocity of liquid in impeller

$f_1 = v_1 \sin \alpha$  (at inlet) (2)

or:  $f_o = v_o \sin \delta$  (at outlet) (2a)

$k$  = weight of unit volume of liquid per second,  
 $l$  = area of streams normal to the direction of flow,

$m$  = mass of liquid flowing per sec.,

$q$  = pounds of liquid per sec.

$q = klf = mg$  (3)

$p$  = pressure per unit area,

$h_d$  = head actually developed by impeller,

$h_1$  = head lost by impeller, through friction, shocks, etc.,

$h$  = total head imparted to the liquid by the impeller.

$h = h_d + h_1$  (4)

$n$  = revolutions per minute,

$\omega$  = angular velocity.

$\omega = 2\pi n/60$  (5)

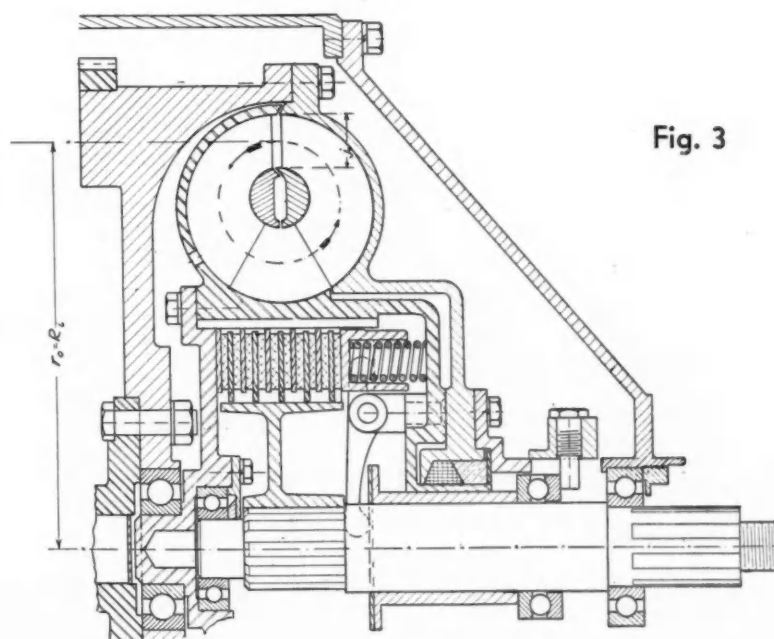


Fig. 3

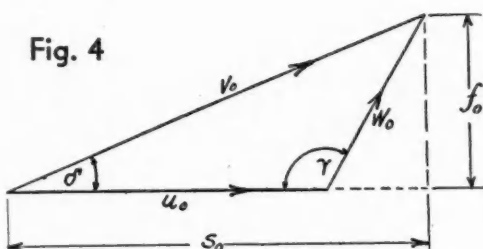


Fig. 4

$t$  = turning moment,  
 $e$  = energy,  
 $g$  = acceleration of gravity.

Values of quantities at specific points will be indicated by subscripts. Subscript (1) will refer to the stream at the inlet to the impeller, and subscript (o) at the outlet.

For the turbine runner the same notation in capitals will be employed.

If the flow is steady and the rate of rotation uniform, the equation of continuity may be applied. This states that the rate of flow past all sections—short circuit losses being neglected—is constant, or that

$$l_o f_o = l_i f_i = L_o F_o = L_i F_i = l f \dots (6)$$

### Forced Vortex with Uniform Angular Velocity

If a vessel containing a liquid is rotated about its axis  $OO$  (Figs. 5 and 7), the liquid will tend to rotate at the same speed, since the angular velocity  $\omega$  is constant. For any radius  $r$

$$u = \omega r \dots (7)$$

The pressure varies from one stream tube to another, increasing toward the periphery of the vessel. This change in pressure may be determined by considering the equilibrium of an elementary column of liquid, of sectional area  $dl$ , of infinitely small length  $dr$ , and weighing  $k dl dr$ , having its axis radial, and resting with its two ends in two stream tubes,  $T_1$  and  $T_2$ , whose pressures are  $p$  and  $(p + dp)$  respectively. The centrifugal force on the column is balanced by the difference of pressure on the two ends, and for equilibrium we have:

$$k dl dr u^2 / gr = dp dl$$

From this we obtain for the increase in pressure radially:

$$\frac{dp}{dr} = k \omega^2 r / g \dots (8)$$

or:  $\int dp = \int k \omega^2 / g r dr$

Integrating between the limits  $r_1$  and  $r_o$  we have

$$(p_o - p_1) / k = (u_o^2 - u_1^2) / 2g \dots (9)$$

Equation (9) determines the increase of pressure between inlet and outlet of the impeller due to centrifugal force.

In a similar way we can determine the decrease of pres-

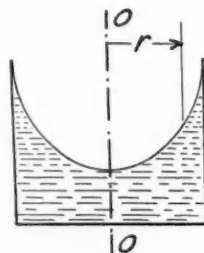


Fig. 5

sure between inlet and outlet of the runner due to centrifugal force:

$$(P_o - P_1) / k = (U_o^2 - U_1^2) / 2g \dots (10)$$

At equal speeds of the impeller and the runner in Fig. 1 the increase of pressure in the impeller would be just equal to the decrease of pressure in the runner; the flow of the liquid would stop, and the transmitted torque would become zero. The difference in speed between impeller and runner is greatest when starting up; therefore, the sum of the pressure increase and decrease is a maximum, with the result that the fluid will pass through the circuit at the highest rate and the slip will be great.

### Angular Momentum

The angular momentum relative to a fixed point  $O$  (Fig. 6) of a body having a mass  $m$  and a motion of translation  $v$  in the direction of the arrow is the product of the momentum  $mv$  of the body into the perpendicular distance  $r \cos \alpha$  of the fixed point  $O$  from the direction of motion (velocity  $v$ ) of the body. Then the angular momentum  $AM$  relatively to point  $O$  in Fig. 6 is:

$$AM = mvr \cos \alpha \dots (11)$$

or the moment of momentum  $AM$ , of the liquid mass  $m_1$  flowing through point 1 per second, about the point  $O$ , is

$$AM_1 = (q/g) r_1 s_1 \text{ (lb.-ft.)} \dots (12)$$

For the case of the impeller diagrammatically shown in Fig. 8, we obtain:

The moment of momentum or the angular momentum of the liquid entering the impeller

vanes per second about the axis of rotation is

$$AM_1 = (q/g) r_1 s_1 \text{ (lb.-ft.)} \dots (13)$$

The final angular momentum  $AM_o$  of the liquid leaving the impeller per second, about the axis of rotation, is

$$AM_o = (q/g) r_o s_o \text{ (lb.-ft.)} \dots (14)$$

The change in angular momentum between the inlet and the outlet is  $AM_o - AM_1$ , and this is equal to the turning moment or the torque exerted by the impeller:

$$t = (q/g) (r_o s_o - r_1 s_1) \dots (15)$$

Work done by this torque per second is

$$e = (q/g) (r_o s_o - r_1 s_1) \omega \dots (16)$$

and the power imparted by the impeller to the liquid is

$$e = (q/g) (u_o s_o - u_1 s_1) \dots (17)$$

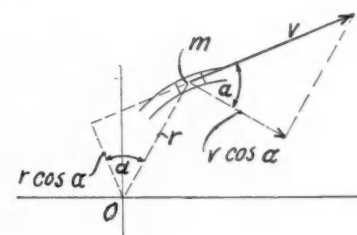


Fig. 6

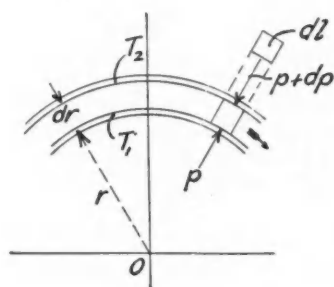


Fig. 7

Equations (15) and (17) are fundamental equations for the calculation of the torque and power-transmitting capacity of turbine clutches.

From the entrance-velocity diagram (similar to Fig. 4) we have

$$w_i^2 = u_i^2 + v_i^2 - 2u_i v_i \cos \alpha \quad (18)$$

and from the exit-velocity diagrams (Fig. 4),

$$w_o^2 = u_o^2 + v_o^2 - u_o v_o \cos \delta \quad (19)$$

Substituting in equation (17) the values of  $u_i$ ,  $s_i$  and  $u_o$ ,  $s_o$  from equations (18) and (19) the second form of the fundamental equation for power is derived,

$$e = (q/2g) (u_o^2 + v_o^2 - w_o^2 - u_i^2 - v_i^2 + w_i^2) \quad (20)$$

$$\text{or } e = q \left( \frac{u_o^2 - u_i^2}{2g} + \frac{v_o^2 - v_i^2}{2g} + \frac{w_i^2 - w_o^2}{2g} \right) \quad (20a)$$

The energy imparted to the liquid by the impeller may also be represented by

$$e = qh \quad (21)$$

Equating this value to that in (20a), we have for the head imparted by the impeller:

$$h = \frac{u_o^2 - u_i^2}{2g} + \frac{v_o^2 - v_i^2}{2g} + \frac{w_i^2 - w_o^2}{2g} \quad (22)$$

In this equation the first term is the pressure head due to centrifugal force, and may be compared with equation (9); the second term is the velocity head, and the third term is the pressure head due to the flow between the vanes.

Conditions and functioning of the turbine runner are entirely similar, but opposite. In the impeller the pressure and the velocity increase, and energy is being absorbed by the liquid; in the runner, however, pressure and velocity decrease, and energy is being given up to the turbine vanes and to the rotor. The torque available on the runner shaft is:

$$T = (q/g) (R_o S_o - R_i S_i) \quad (15a)$$

and the energy transmitted to the driven shaft,

$$E = (q/g) (U_o S_o - U_i S_i) \quad (17a)$$

The efficiency of the device depends on the relative slip of the runner, which, however, is very small under ordinary operating conditions.

From Fig. 1, and by comparing equations (15) and (15a), it is apparent that the turning moment  $t$  of the impeller and  $T$  of the runner are always equal, because  $r_o = R_i$  and  $r_i = R_o$ ; moreover, the velocity  $v_o$  of the liquid at the discharge of the driving member equals the entrance velocity  $V_i$  of the driven member; and, vice versa,  $v_o = V_i$  and  $v_i = V_o$ ; consequently,  $t = T$  under all conditions. Impeller and runner torques are equal because it is impossible to increase the torque in a turbine transmitter which comprises driving and driven vanes only and no stationary vanes.

Further, because  $t = T$ , any loss of energy due to friction, shock, etc., must be at the expense of runner speed; this is the reason the runner can never quite attain the speed of the impeller.

## Axial Thrust

Definite pressures exist in spaces  $E'$ ,  $F'$ ,  $J'$ , between the impeller web and runner web and their surrounding casing, and between the impeller and runner shrouds (see Fig. 1). If unit pressures on opposite sides of the impeller are not equal, and if these pressures do not act on equal areas of the impeller, an axial thrust will be produced. This applies also to the runner. These thrusts are caused by the pressure differences in the space between the impeller, the runner and the casing, and by the action of the centrifugal forces of the liquid in these spaces forming rotating paraboloids (Fig. 5). Further, when the runner rotates with considerable slippage, the pressure in space  $F'$  will be smaller than that in  $E'$ .

Various means have been tried to prevent axial thrust. About the simplest way seems to be to provide small openings  $C'$ ,  $D'$  in the webs of the impeller and runner, to equalize pressures on both sides of the webs, and to make the clearance spaces  $K'$ ,  $L'$ ,  $M'$  small, in order to reduce short-circuit losses. It is necessary to provide thrust bearings of considerable capacity, however, especially in high-speed turbine clutches.

## Example

What torque and horsepower can be transmitted by the turbine clutch shown in Fig. 3 when  $r_o = 5.5$  in.;  $n = 3000$  r.p.m., vane angle  $\gamma = \beta = 90$  deg., velocity angle  $\alpha = \delta = 90$  deg.,  $k = 62.4$ ,  $f_o = 9$  ft. p. s., and width of outlet channel  $j_o = 0.68$  in.?

The impeller outlet-channel area is

$$l_o = \pi \times 11 \times 0.68 = 23.5 \text{ sq. in.} = 0.163 \text{ sq. ft.}$$

The weight of liquid circulating per second is

$$q = 62.4 \times 0.163 \times 9 = 91.5 \text{ lb.}$$

Angles  $\alpha$  and  $\gamma$  being 90 deg. (Fig. 8)

$$s_i = 0 \text{ and } s_o = u_o = 144 \text{ ft. p. s. (see Fig. 4)}$$

$$\text{Then the torque } t \text{ required to drive this impeller is } \frac{91.5}{32.2} \times \frac{5.5}{12} \times 144 = 187.5 \text{ lb.-ft.}$$

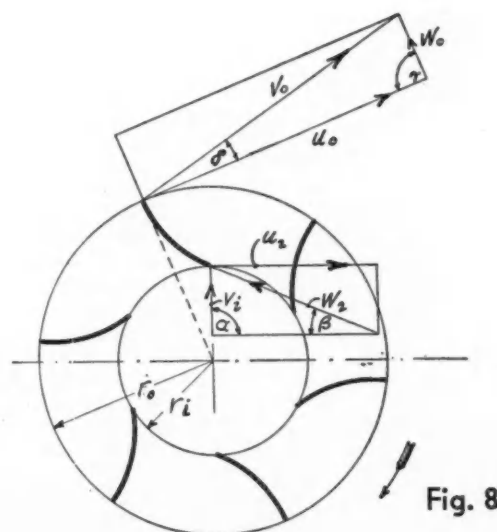


Fig. 8

If now the speed of the engine is reduced and the engine torque remains practically constant, the velocity  $f$  of liquid flow must increase in the inverse ratio. That is the reason the slip increases as the speed drops, because at lower speed greater pressure is required to produce a greater flow. The value of  $s_1$  being zero in this case, equation (15) can be written

$$t = (q/g) r_o \omega \quad (15b)$$

The rate of liquid flow depends on the slip, hence we can write

$$t = \text{slip} \times \text{speed} \times \text{constant} \quad (24)$$

Further,

$$\omega = 2\pi \times 3000/60 = 314 \text{ radians per second}$$

Therefore, the horsepower absorbed by the impeller is

$$\frac{187.5 \times 314}{550} = 107 \text{ hp.}$$

From the above calculation it is apparent that a turbine clutch of the dimensions given is large enough to be used with an eight-cylinder engine of 3.25 in. bore and 4.50 in. stroke.

If a still further reduction in the size of the turbine clutch is required, two-stage and three-stage devices offer great possibilities.

The chief advantages of the turbine clutch are steady torque, perfectly smooth starting and low-speed running, absence of shuddering, "hesitation," shocks and jerks, and consequent lowering of maximum stresses and of fatigue failures.

## Mr. Bendix Salutes a Pioneer

More about the Canadian National Motor Show, the S. A. E., Free Wheeling and the Genesis of Our Export Trade + + + +

Editor, AUTOMOTIVE INDUSTRIES:

The most important remaining convention to be held during Canada's National Motor Show is the annual meeting of the Canadian Automobile Association on the tenth at the Royal York Hotel, and among those from across "the far flung bottle line" who have indicated their intention of attending are Ernest N. Smith, Executive Vice-President of the American Automobile Association; Col. W. S. Gilbreath, Executive Vice-President of the Automobile Club of Michigan; Dick Harfst and Dai Lewis, both directors of the A.A.A.

We had an attendance of nearly three hundred at the Canadian Section, Society of Automotive Engineers' Automotive Day Banquet at the Royal York, Tuesday night, Sept. 1. Vincent Bendix and John Warner were delighted with the event after a day at the Canadian National Exhibition. Bendix declared in his brief speech that he is going to urge that the Society hold its next annual summer meeting in Toronto. He told me that he was amazed at the size and scope of the show here and that as long as his health permitted, he would not miss another one.

A rather nice little incident occurred immediately following the luncheon at the Administration Building, Exhibition City. Gib Robertson introduced Mr. Bendix to Dr. P. E. Doolittle, President of the Canadian Automobile Association. Bendix with a graceful gesture, swept his hat from his head, accompanying the action with the words, "I salute the father of free wheeling. Observe I have taken off my hat to him." He alluded to the little known fact that Dr. Doolittle was the inventor of the Morrow Coaster Brake

which he sold to a syndicate in London, England, outright for \$50,000. This syndicate very soon afterwards disposed of the American rights to the Eclipse and Morrow people in the United States for three times that amount. Doolittle is also the inventor of the Doolittle bypass valve for carburetors, Stepney wheel and the demountable rim, on none of which he realized anything like adequate returns. Bendix admitted that the royalties from a single patent of his for many years had provided him with a revenue of between \$400,000 and \$500,000 per annum.

Another picturesque personality at the luncheon was Canada's first motorist, and the second customer of the automotive industry of the United States, Col. John Moodie, of Port Nelson, Ontario, who bought Alexander Winton's second commercially produced car on April 1, 1898. Had he purchased that car 24 hours earlier, a Canadian would have been the first customer of what is now the greatest manufacturing industry in the United States. I will vouch for the verity of this statement as I have the receipt for the purchase of the car, a letter from Alexander Winton on the subject, plus statements from both the National Automobile Chamber of Commerce and the American Automobile Association to the effect that Winton was the first producer of commercial vehicles in the United States. So you see the genesis of the now rather sorely vexed export business of the industry was almost coincident with the genesis of the industry itself in your country.

Yours very faithfully,  
W. B. HASTINGS.

Mr. Hastings is editor of the Canadian Motorist and secretary of the Canadian Section of the S.A.E.

# PRODUCTION LINES



## Speeds Metal Cleaning

No one doubts the importance of metal cleaning prior to finishing operations. Indeed proper preparation of metal surfaces is a prime requisite to satisfactory work. Wyandotte, the well-known metal cleaner (made by The J. B. Ford Co.), and its many applications in automotive production now are described in a new handbook just off the press. Typical operations discussed in this handbook are: Cleaning motor blocks, cleaning after heat-treating, cleaning before plating, and the like.

## Give the Facts

Material alone is not the determining factor in selecting grinding wheels, according to *Grits and Grinds*, July, 1931. Not nearly enough in fact when tooling up for a new job. If you want good results give the wheel maker some of these details:

- Material specifications.
- Wheel dimensions.
- Size of weight of work.
- Describe operation and machine.
- Finish required.

## More About Machinability

In *Automotive Industries*, June 6, 1931, p. 874, we discussed a paper presented by T. G. Digges at the A.S.M.E. Hartford meeting. Some new data were given at that time concerning lathe tools and tool steels. This material is now available in complete form in Research Paper No. 319, Bureau of Standards, entitled "The Influence of Chem-

ical Composition and Heat Treatment of Steel Forgings on Machinability with Shallow Lathe Cuts," by T. G. Digges.

## According to Hoyle

In a recent letter to the sales staff of the Osterlein Machine Co., Charles D. Osterlein propounded the following formula for production by the new offset milling process. Try it out on one of your high production jobs. Here it is:

$$P = 10 \text{ times } \frac{F \times N}{D}$$

Where:

- $P$  = Production (parts per hr.)
- $F$  = Feed (in. per min.)
- $N$  = Number work holding units  
—in fixture
- $D$  = Depth of cut (in inches)

### EXAMPLE

- If  $F = 6$  in. per min.  
 $N = 6$  units  
 $D = 1$ -in. cut

$$\text{Then } P = 10 \text{ times } \frac{6 \times 6}{1} = 360$$

For the purpose of estimating production, figure on the same rate of feed when handling a job on the offset mill as that used on any other milling machine, although a somewhat heavier feed is permissible for a given finish, because of the steadying effect of offset milling. The depth of cut can be measured directly. Only the number of work-holding units to be put into a fixture requires a separate decision.

• Notice from the formula the effect of using various numbers of work-holding units. To illustrate: With 6-in. feed per minute, 1 in. depth of cut—

### 4-Unit Fixture

$$P = 10 \text{ times } \frac{6 \times 4}{1} = 240$$

### 8-Unit Fixture

$$P = 10 \text{ times } \frac{6 \times 8}{1} = 480$$

### 12-Unit Fixture

$$P = 10 \text{ times } \frac{6 \times 12}{1} = 720$$

## Keep the Ball Rolling

With the approach of the seasonal decline in tire buying by the public, Goodyear executives are laying plans to stabilize employment this winter. According to an announce-

ment just made, their objective is to hold the total number of employees at the present level. Among other devices they have explored are: staggering of employment, the six-hour day, and four shifts. By minimizing layoffs this will be their contribution to the President's efforts to stabilize employment.

## Add This One

Hafnium, a rare metal discovered about eight years ago, has valuable properties of great interest to the electrical industry. High electron emissivity combined with high melting point (over 2200 deg. C.) fit it for use in filaments and for the cathode surfaces of X-ray tubes and rectifiers. The pure metal is soft and pliable like copper, and about 50 per cent heavier. According to U. S. Bureau of Mines Information Circular No. 6457, refining cost is very high, due to the difficulty of separating it from its sister element zirconium, so that compounds such as the chloride and oxide can still be purchased in small amounts only, even at \$10,000 per pound.

## Back in the Ring

Vol. 1, No. 1, of the NEW Houghton Line came through the other day as announced in *Automotive Industries*, August 15. The freshness and pep we used to enjoy are there in good measure. But there is a noticeable difference. Prohibition, suffrage and rackets will be interlarded with technical articles on vim, belting, rust, veto, lubrication and what not. For *Black and White* is no more. Now it's incorporated in the new house organ. If you enjoyed the outstanding technical work of the Houghton Research Staff be sure to get on the mailing list of the NEW Houghton Line. We'll be glad to help you. —J. G.

**M**ANUFACTURING  
MANAGEMENT  
METALLURGY

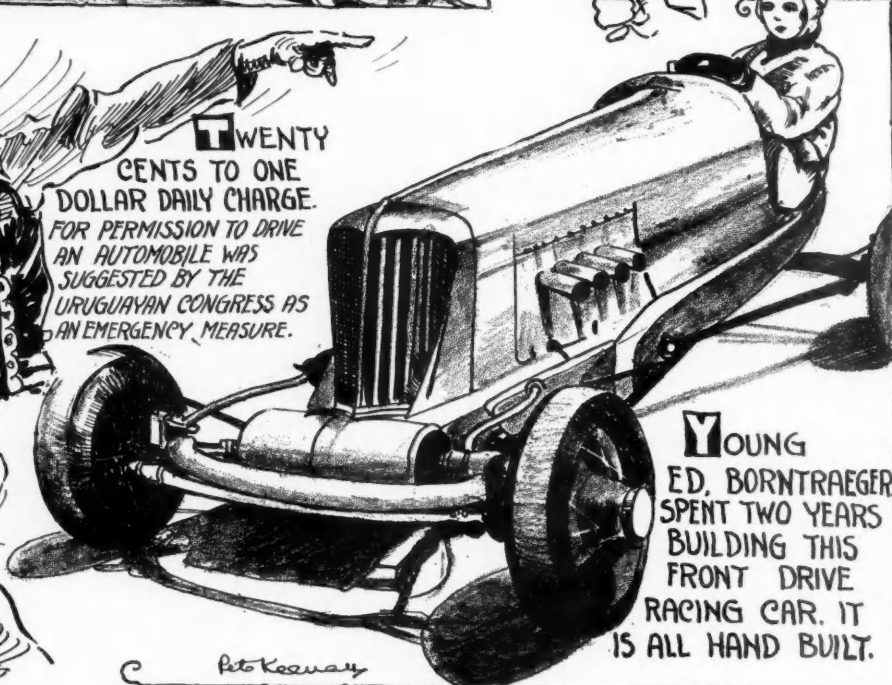
# Automotive Oddities—By Pete Keenan



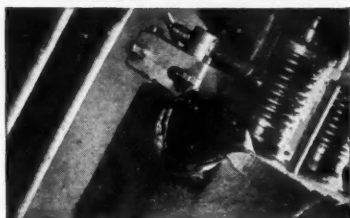
A PRACTICAL JOKER ELECTRIFIED THE GAS TANK CAP. TO SHOCK THE GAS STATION ATTENDANTS. (THE POLICE GOT HIM) Petros 1931



FIVE WOMEN ARE LICENSED TO TINKER WITH AIRPLANE ENGINES.



Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



# NEWS

## OF THE INDUSTRY



### New M.E.A. Set-Up Explained by Satchell

Present Organization Continues to Dec. 1

NEW YORK, Sept. 10—Changes in the set-up of the Motor & Equipment Association under the proposed reorganization plan which will result in the splitting of the association into one for wholesalers and one for manufacturers. The association will function as at present until Dec. 31 of this year, however.

E. T. Satchell, president, in a statement explaining the new form of organization, pointed out that the organizations will be separate in entity and will each possess full autonomy, but that they will work in harmony in all matters of inter-relationships.

On Sept. 1, members were billed for four months dues at current rates for the remainder of 1931. All M.E.A. members in good standing between Sept. 1 and Dec. 31, and classified in Divisions "A" or "B" were made members during this period in the newly created M.E.A. without initiation fees or dues; and in a similar manner all M.E.A. members classified in Division "C" are likewise automatically made members during this period in the newly created Motor & Equipment Wholesalers Association without initiation fees or dues.

(Continued on page 407)

### William L. Marsh

DETROIT, Sept. 8—William L. Marsh, of Marsh and Haggott, Michigan sales representatives for several automotive product concerns, including Packard Electric, was killed here last week when an automobile he was driving was struck by a Pere Marquette train and dragged a quarter mile down the track, derailing the engine and six coaches. Mr. Marsh was 54 years old.

ONE of our learned colleagues remarks that the Harmsworth Trophy Race in D. T. last week was evidently a legal contest, rather than a sporting contest, which leads us to the observation that there oughtn't to be any trouble like that on the 12th, when Britain races against herself or against time, for the Schneider Trophy\*\*\* Some Ford dealers are dogging up the De Luxe Model A's beyond the factory requirements, listing the extras separately on the price tag, and generally doing things which would have caused a lot of ruckus a very few years back: one type we've seen has door-type louvers on the hood, wire wheels by Motor Wheel, and a radiator core screen, the net increment being about \$42.50 f.o.b. anywhere\*\*\* Myron C. Taylor, chairman of the finance committee of the United Steel Corp. was a recent visitor at the plant of the A. O. Smith Corp. Both Mr. Taylor and L. R. Smith, president of the robotplant denied that Mr. Taylor had deep motives for the visit\*\*\* Workers in the Reo plant are contributing to a fund which will be used to set up a store within the plant. From this store, needy employees living outside Lansing limits and who do not come under the provisions of Reo's relief work inside the city limits, will be enabled to obtain food and clothing to tide them through the lean periods. The company is helping out with the proposition, and there is assurance that it is not intended to replace the usual relief work, which Reo has got on a pretty sound basis\*\*\* Henry L. Doherty, the public utilities bigshot, has presented the A. S. M. E. with a cool half million to be used in research on the causes and remedy of unemployment: if many more funds like that are set up there will be jobs for everyone; researching into the causes and cure for unemployment . . . the questionnaire industry will benefit . . . so will the paper industry and the printing, and the U. S. mails . . . pretty soon everybody will be taken care of and everything will be jake . . . then someone will be importunate enough to get hungry, and the whole cycle of *mala* will begin again\*\*\* Chicago has opened a new automobile court in a drive to reduce the automobile death toll. "Fixing" of tickets, ignoring of summons and other common violations are said to be at an end under the new system. Warrants were issued for 200 motorists who failed to appear on the opening day of the new court.\*\*\* Owners of dogs or automobiles cannot expect to get assistance from the poor relief fund of Cedar Creek (Ind.) Township, says H. O. Burnham, trustee. His announcement read: "Poor people who own dogs or autos cannot expect help. Township will not furnish gas for autos or feed for dogs. One dog's feed will feed a child.\*\*\*" Ship- ment of a Cord front drive Phaeton Sedan was made to the President of the Dominican Republic.—H. H.

THE  
NEWS  
TRAILER

### Japanese Plan Wider Industry

New Financing Will Be Undertaken

WASHINGTON, Sept. 8—The recent absorption of the DAT Motor Car Company, one of Japan's three automobile manufacturers, by the Tobata Iron Foundry again focuses attention on the consideration in Japan of plans for the formation of a domestic automobile manufacturing industry, according to advices to the Automotive Division, Department of Commerce, from Paul P. Steintorf, American Trade Commissioner at Tokyo.

It is reported that this merger plans to undertake the manufacture of automotive parts and accessories on an extensive scale and it is understood to have made arrangements for the flotation of a debenture issue in the amount of yen 4,000,000 to finance this business.

In view of the fact that the DAT Company has been a manufacturer of trucks, it is also to be expected that commercial vehicles will be manufactured under the control of the Tobata Iron Foundry. When the reports of negotiations regarding this purchase of the DAT Company were first announced, it was stated that the new organization would begin the production of motor trucks on a basis of all-Japanese materials.

### Gets Dardelet License

CLEVELAND, Sept. 9—The National Acme Co. has entered into a license agreement with the Dardelet Threadlock Corp., New York, under which National Acme will manufacture self-locking screw threads on Dardelet patents.

### Parker Joins Federal

Carl Parker, formerly sales manager of the truck division of Reo Motor Car Co., has joined Federal Motor Truck Co. and will be in charge of branches.

## Rifle Drilling Promises Saving

Improvements in Method Foreshadow Wider Use in Industry

(Continued from page 384)

both ends. Today vertical rifle-drilling equipment is available which will cut former costs to a fraction.

When a designer adopts pressure feed to the pins, he is faced with the necessity of selecting one of three possible alternatives:

1. Rifle-drilled rods.
2. Rods drilled from both ends on a horizontal machine.
3. Tube or "plumbing" to carry oil.

We need not dwell very much on the latter construction because it has just passed out of the picture in passenger car practice. Its use now is largely confined to certain low-production, heavy-duty, industrial engines.

Consider drilled connecting rods. The consensus is that the first method, that of rifle drilling, has obsoleted the second method for good and sufficient reasons. According to those who have adopted the method, here are a few of the important advantages of rifle drilling:

1. It requires less floor space than the horizontal type. One six-spindle vertical machine requires only slightly more space than a two-spindle horizontal. This in itself is one of the most powerful considerations.
2. The vertical machine is easier to load and unload.
3. It is easier to keep clean and practically free from trouble due to small chips clogging the ways of the rod feed.
4. The rifle-drilled hole is smooth and true and free from chips. When drilling from both ends the hole is not always coaxial, with the result that it is sometimes partly closed by a chip.
5. A true, straight hole such as is produced by rifle drilling is absolutely essential for aircraft work and high-speed passenger engine. When drilling from both ends there is always the possibility of a thin wall which is generally productive of fatigue failure.

Rifle drilling and rifle-drilling equipment have progressed a long way since the first machines were installed in 1928. The reluctance of some engineers and production men to the adoption of the method may be traced to the early experiences with this equipment. But many basic improvements have been made. Probably the most important one is the

adoption of a new type oil filter which positively frees the cutting fluid of metal chips. However, the most radical improvement lies in the design of the special drills. These are now produced by a newly developed process of electric butt welding the high-speed steel tips on a heat-treated seamless steel tube.

Moreover on the basis of experience acquired in the last few years it is possible to increase the life of drills to an astonishing degree by controlling the material and the treatment of connecting rods before the rifle-drilling operation.

## South Africa Becomes Premier Canadian Market

OTTAWA, Sept. 8—South Africa was Canada's best customer for automobiles during the month of July, according to a report issued by the Dominion Bureau of Statistics. In both freight and passenger cars the Union of South Africa purchased more than any other country, although British India came a close second. South Africa's purchases totaled \$117,160.

The total number of commercial vehicles exported in July was 290, valued at \$114,818, an increase from 232, valued at \$88,759 in June, but a drop from 1050, valued at \$377,276 in July, 1930.

A corresponding decline is noted in the export of passenger cars, the number being 644 last month, with a valuation of \$271,300. This was a drop from 789 cars, valued at \$335,303 in June, and 2471 cars valued at \$1,103,652 in July of last year.

Production of automobiles in Canada during July numbered 4220 cars, including 3151 passenger cars and 1069 trucks. This output at the rate of 136 cars a day was 40 per cent under the 228 cars per day in June as compared with a daily average of 329 cars in July, 1930. Comparison of this month's figures with data for the previous month shows that passenger cars dropped from 5583.

## Steel Wheels on 90%

NEW YORK, Sept. 9—Budd Wheel Co. announces that over 90 per cent of the motor car production during the first six months of this year was on steel wheels, as compared with 87 per cent for the first six months of last year.

This company attributes this increase in proportion to increased popular demand for wire wheels, combined with improvements in design and development of manufacturing economies.

## Canadian Traffic Increases

TORONTO, ONT., Sept. 8—Checks by Ontario traffic police show an increase of 11 per cent in motor traffic generally over 1930. United States motor cars coming into Canada showed an 8 per cent increase.

## Plan Salons At Four Points

No Change In Places or Number Scheduled This Year

NEW YORK, Sept. 8—Four major automobile salons will be held during the 1931-1932 season, it has been announced. No change has been made this year in the places where they will be held, or the number of events. The schedule follows:

New York, Hotel Commodore, Nov. 29-Dec. 5  
Chicago, Hotel Drake, Jan. 30-Feb. 6  
Los Angeles, Hotel Biltmore, Feb. 13-20  
San Francisco, Palace Hotel, Feb. 27-March 5.

Participation in all the salons will continue to be limited to high-priced chassis and custom coach work.

Previous to this year, the company operating the salons as a private enterprise had been denied the official sanction of the National Automobile Chamber of Commerce for salons in New York and Chicago. This year an agreement has been reached whereby salon basic management will continue in the hands of the operating company, under N.A.C.C. sanction, but in New York and Chicago the local dealer associations will have a voice in deciding what cars are to be exhibited, arrangement of exhibits, etc. The dealers associations in New York and Chicago will be represented in the salon management by Harry G. Bragg and A. C. Faeh, secretaries of the respective associations concerned. It is understood that factory participation in the salons, through metropolitan dealers, will be probable under the new arrangement.

## Many Show Inquiries In

NEW YORK, Sept. 9—An unusual number of early inquiries from the prospective exhibitors in the annual National Motor Shows to be held in New York and Chicago has been received by S. A. Miles, manager of these shows. As a result of these inquiries, rearrangement of the floor space has been necessitated.

Applications from automobile manufacturers must be filed by Oct. 3 and the annual show drawing will be held in connection with the fall members' meeting of the National Automobile Chamber of Commerce to be held in New York, Oct. 8.

Charles D. Hastings, chairman of the board of Hupp Motor Car Corp., is chairman of the Show Committee; and A. R. Erskine, president of Studebaker Corp., and Alfred H. Swayne, vice-president of General Motors Corp., are the other members of this committee.

The New York show is to be held in the Grand Central Palace, Jan. 9 to 16, and the Chicago show in the Coliseum, Jan. 30 to Feb. 6.

## Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

**NEW YORK, Sept. 9**—While seasonal improvement continues to be reported in some branches of wholesale and retail trade, no significant upturn in business activity as a whole is yet apparent. Basic industrial operations remain at a very low level.

### RAILWAY TRAFFIC

The volume of railway freight traffic continues to increase very slowly. Loadings of revenue freight for the week ended Aug. 22 totaled 748,711 cars, showing an increase of 5975 cars above the total for the preceding week but a decrease of 191,847 cars below that for the corresponding week last year and a decline of 389,255 cars under that for the same week two years ago.

### LUMBER PRODUCTION

For the third successive week, lumber production was smaller than new business during the week ended Aug. 29, according to reports from 840 leading hardwood and softwood mills to the National Lumber Manufacturers Association. These mills reported orders 6 per cent in excess of their combined output and shipments 12 per cent above output.

### WORLD WHEAT OUTPUT

A decline of 5 per cent in world wheat production is indicated in a survey by the Department of Agriculture, which estimates the world crop in all countries except Russia in 1931 at 2,992,280,000 bushels, as against 3,142,112,000 bushels in 1930. The estimated world's carry-over, however, is the highest in history, amounting to 679,000,000 bushels, as against 578,000,000 bushels a year ago.

### OIL OUTPUT

The complete shutdown of oil wells in the East Texas field was reflected in the output for the week ended Aug. 29, which averaged only 1,751,550 barrels daily as against 2,608,250 barrels in the preceding week and 2,461,350 barrels in the corresponding period last year. Production was resumed in the East Texas field on Sept. 5, with a daily flow of 225 barrels allowed for each well.

### BUSINESS FAILURES

Business failures reported to Bradstreet's last week were 18.4 per cent fewer than a week earlier, the smallest total since Oct. 2, 1930, and 5.1 per cent fewer than in the like week of 1930.

### BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Sept. 2 were 12 per cent smaller than in the corresponding period last year, which was a five-day week due to the observance of Labor Day.

### FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices stood at 68.9 last week, as against 68.9 a week earlier and 69.4 two weeks earlier.

### RESERVE STATEMENT

Discounts of the Federal Reserve banks during the week ended Sept. 2 increased \$15,000,000, and open market purchases \$17,000,000, while holdings of Government securities remained practically unchanged for the third successive week. Note circulation increased \$12,000,000, while deposits decreased \$17,000,000 and reserve \$25,000,000. The reserve ratio declined for the fifth consecutive time, standing at 79.4 per cent at the end of the period, as against 79.9 per cent a week earlier and 84.3 per cent on July 29.

## August Output: 197,030

**NEW YORK, Sept. 9**—Production during August is placed at 197,030 cars and trucks in the United States and Canada, according to figures announced at the meeting of the board of directors of the National Automobile Chamber of Commerce here today.

This represents a drop of 12 per cent under July, as compared with a drop of 15 per cent in August last year under July of that year. Production for the first eight months in the current year thus becomes 2,054,781, which represents a decrease of 27 per cent under the eight months of last year. It thus becomes evident that the margin between sales of last year and sales of the current year is decreasing.

## Non-Sales Divisions In G.M. Sales Contest

**NEW YORK, Sept. 8**—General Motors Acceptance Corp. and General Exchange Insurance Corp. are staging a sales contest among their employees during the first 25 days of September.

During the period of the contest, GMAC and GEIC employees will undertake to sell \$2,000,000 of General Motors products, either new or used cars, or other products of the corporation.

Points will be awarded to employees in these two companies on the basis of 25 points for the sale of a new car; 15 points for the sale of a used car; five points for the sale of a product valued at less than \$100; and one point each for prospects turned in, points thus awarded not to exceed points earned from actual sales.

There will be a number of cash prizes awarded in addition to trips to the home office and to General Motors proving ground, in addition to a number of trophies put up by various manufacturing divisions of General Motors.

This is the first attempt on the part of GMAC and GEIC to have their employees sell cars and the contest has the two-fold purpose of increasing the sales of General Motors products and in the further education of the employees of these two subsidiary companies.

## Diamond T Sales Gain

**CHICAGO, Sept. 8**—August sales of Diamond T Motor Car Co. were 20 per cent ahead of the same month last year, E. J. Bush, vice-president in charge of sales, announced today.

## Ostrander Succeeds Bendick

C. B. Ostrander, manager of the branch of the Ford Motor Co., at Memphis, Tenn., has been transferred to the Twin Cities branch as manager, in place of A. W. Bendick, who has resigned after several years service in that position.

## Graham Takes Eastern Territory

### Will Operate It From Factory Branch in New York

**NEW YORK, Sept. 8**—Graham-Paige Motors Corp. has altered its scheme of distribution for the Eastern territory and will now cover this area from a factory branch, under the charge of Major Harry L. Stratton, formerly president of Colt-Stratton Co., and later of Stratton-Bliss Co. Major Stratton's district will include eastern New York from Syracuse, northern New Jersey and western Connecticut. R. G. Craig, field representative from New York with headquarters in Newark, will conduct supervision of dealers in that territory.

Henry Harris, wholesale sales manager of Graham-Paige New York City Corp., formerly distributors for this territory, will become general sales manager of the C. H. Jennings Corp., which will operate as a dealer outlet in Manhattan.

T. H. Bridgman will continue as secretary and treasurer of the C. H. Jennings Corp. and Ray A. Graham will be general manager of that company.

C. H. Jennings, while maintaining his interest in the C. H. Jennings Corp. and retaining the position of vice-president and director, will retire from active participation in the business and will take up his permanent residence in North Carolina, where he has owned property for a long time.

C. H. Jennings Corp., in addition to handling retail sales in Manhattan, will operate as a distributor in Bronx, Westchester and in other points.

## Experiments With "Air-Wheel"

**NEW YORK, Sept. 8**—Goodyear Tire and Rubber Co. has been experimenting with the air-wheel developed for airplane use as applied to automobiles, trucks and tractors. These large pillow-like tires, carrying a large volume of air at pressures from 10 to 20 lb., have been found to be very successful on tractors in use on golf courses, airports and citrus fruit groves. Trucks have been tried out which have operated from 25,000 to 40,000 miles satisfactorily on air-wheel type tires. Advantages claimed for this are increased traction due to greater surface contact and greater non-skid properties.

## Hardware Asso. to Meet

**NEW YORK, Sept. 8**—The National Hardware Association of the United States will hold its 37th annual convention at the Palmer House, Chicago, Ill., Oct. 19 to 22.

## Men of the Industry and What They Are Doing

### Heintz Names Hannum

The appointment of George H. Hannum, former president and general manager of the Oakland Motor Car Co., and of the Saginaw Products Division of the General Motors Corp. as general manager of the Heintz Mfg. Co., Philadelphia, maker of automobile bodies and heavy stampings, has been announced.

Until recently Mr. Hannum has been president and general manager of the Hannum Mfg. Co., Milwaukee, a company which he formed in 1925 to take over the plant and business of the Lavine Gear Co., subsequently manufacturing the Hannum steering gear, designed for use with heavy duty chassis. Mr. Hannum has disposed of his interest in, and completely severed his connection with, the Milwaukee Company, he told *Automotive Industries*.

At the time of forming the Milwaukee Company, Mr. Hannum completed an association of 14 years with various divisions of General Motors, which began about 1911, when he became factory manager of the Jackson-Church-Wilcox Co., later known as the Saginaw Products Co., and included special assignments for Buick. At one time he was chief inspector of the Autocar Co., Ardmore, Pa.

In forming a connection with the Heintz Mfg. Co., Mr. Hannum returns for the third time to the vicinity of his birthplace, after broad industrial experience which has taken him into many sections of the United States.

### Goodrich Names Two

Two changes in the sales organization of The B. F. Goodrich Co. have been announced. A. H. Leavitt, formerly manager of the north-central district, is transferred to Buffalo, N. Y., in charge of area constituting the Buffalo branch district.

The other change is the appointment of W. C. Manley to the Pittsburgh division, with territory covering western Pennsylvania, eastern Ohio, West Virginia and part of Maryland.

### Overland Names Beardsley

Nelson A. Beardsley becomes general sales manager of the Willys-Overland Co., Harry B. Harper, vice-president in charge of sales, has announced. Mr. Beardsley rises to this position after a connection with the company covering a period of more than 16 years.

He first joined Willys-Overland in 1915 when he became manager of Buffalo-Overland, Inc., at Buffalo. The following year that company was taken over by Willys-Overland and

he was appointed manager of the factory branch.

Late in 1927 he was brought to the home office in Toledo as regional sales manager and shortly thereafter was made general sales manager of the Eastern Division, which comprised 26 states. He held this position to the time of his latest appointment. Under the present sales set-up there will be no territorial division as heretofore. Since his connection with the home office Mr. Beardsley has spent the major portion of his time in the field.

### Cincinnati Names Bergstrom

S. E. Bergstrom has been named manager of the Detroit office of the Cincinnati Milling Machine Co. as part of a plan which contemplates establishment of direct sales representation for the company in Detroit, Cleveland, Chicago and Cincinnati.

### Goodrich Names Richards

R. W. Richards has been appointed assistant general sales manager of the Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto. Mr. Richards was formerly manager of tire sales and has been with Goodyear for 20 years.

### Glasson Joins Federal

Rex Glasson, formerly sales promotion manager, Dodge Brothers Corp., has joined the Federal Motor Truck Co. in a similar capacity.

### Dominion Motors Declares

TORONTO, Sept. 8—Directors of Dominion Motors, Ltd. (formerly Durrant Motors of Canada), meeting here last week, declared the regular semi-annual dividend of 40 cents a share on the approximately 300,000 shares of common stock outstanding, most of which are in Canadian hands. While current earnings of the company are not at a rate to meet the dividend disbursement, the surplus is adequate, and it is understood that cash items in the company's asset list total more than \$1,000,000.

### Markets New Suspension

CLEVELAND, Sept. 9—Patent rights to a new engine mounting system, said to be particularly applicable to Ford Model A engines, have been purchased by the Corozone Co. of this city. It consists of a three-point mounting in live rubber and is claimed to reduce vibration and add to the life of the car. An equipment known as the Corozone motor vibration absorber will be marketed through the trade.

## British Entries Set For Schneider Race

Press Advices Indicate They Are Alone in the Field

PHILADELPHIA, Sept. 10—On Sept. 2 word was received in this country that both France and Italy had notified the Royal Aero Club of Great Britain that they would be compelled to withdraw from the Schneider Cup race unless it were postponed, the reasons given for the request being, according to one report, "bad weather, bad luck, and loss of machines." However, according to the rules, postponement could be made only on account of bad weather, from day to day. When the French and Italian clubs were apprised of the situation they both withdrew from the race leaving Great Britain alone in the field. The best information available, as *Automotive Industries* went to press, was that one or more of the available British planes would be sent around the course in an attempt to set a new speed mark.

The Schneider Trophy was presented in 1913 by Jacques Schneider, the French steel magnate, to the Aero Club of France for an annual speed contest between seaplanes of any nationality. Formulation of the conditions governing the contest was left to the Federation Aeronautique Internationale (F A I). Each country is allowed to enter a maximum of three competing planes through the national club affiliated with the Federation. The first race took place in Monaco in 1913, and since that time the race always has been held in the country which won the last previous race. In 1928 it was decided that the race should take place every other year, instead of annually, as it was felt that the technical advancement made in one year was not sufficient to expect great increase in the speed of racing seaplanes.

Ten races were held for the trophy previous to the one just concluded. Of these Great Britain won four, Italy three, the United States two, and France one. There were no contests during the period of the war, and the

(Turn to page 410, please)

### Local Race Pulls Heavily

SALEM, N. H., Sept. 9—It was announced here today that 45,300 people were present to see the races at Rockingham Park on Labor Day, with a minimum admission of \$1. Yet no stars like those at Indianapolis were on the bill except Ralph De Palma, and the races were on the flat one-mile dirt track. And the feature race was only 25 miles, won by Archie Powell, Burt Karnatz second, De Palma third.

## Wholesale Paper Held Up In July

Unit Average For Retail Classification Drops a Dollar

WASHINGTON, Sept. 10—Wholesale automobile financing reached a volume of \$48,894,753 during the month of July, according to preliminary figures released this week by the Bureau of the Census. During the month of July, 1930, wholesale volume reached \$55,319,248, and during June of this year the revised figures showed a volume of 58,178,419, the compilation shows.

Total retail financing for all classifications, during the month of July reached a volume of \$92,974,660, an average of \$393 per unit financed, as compared with a total volume of \$118,819,832 and a unit average of \$414 for the corresponding month of 1930. Comparisons in various classifications follow:

TOTAL RETAIL FINANCING			
	No. of Cars	Volume	Average Per Car
June, 1931...	265,564	\$104,698,405	\$394
NEW CARS			
July, 1931...	100,897	\$56,293,556	\$558
July, 1930...	130,659	73,458,525	562
June, 1931...	115,128	63,565,852	552
USED CARS			
July, 1931...	128,492	\$34,171,299	\$266
July, 1930...	149,706	42,676,831	285
June, 1931...	141,982	37,999,214	268

## Ford Employment Up

DETROIT, Sept. 9—Ford Motor Co. employment yesterday morning stood at 65,000 in this area, with more returning to work yesterday and today. It is expected that before the month is out employment will reach a new high peak for the year as production once more gets under way.

## Briggs Body Busy

DETROIT, Sept. 9—The tool and die division of Briggs Manufacturing Co. is now operating on a 24 hour, seven-day week basis. It is understood that the rush is due to development of production dies and tools for the larger Ford bodies.

## Kreusser is Elected

O. T. Kreusser, research engineer for Fisher Body Corp. has been elected a director of the Julius Rosenwald Museum of Science and Industry, according to an announcement by W. Rufus Abbott, president of the Board of Trustees.

## Gives Up Reo Line

BOSTON, Sept. 12—Charles R. Dunbar, Dwight T. Hersey and George Bradburn, operating in Boston as the Reo Motor Car Co. of New England, distributors for Reo and De Vaux cars, gave up the Reo line and

their lease on the building at 900 Commonwealth Avenue. The Reo Motor Car Company is considering a factory wholesale branch using the present sales and service building, with the retail all under the Linscott Motor Company, that had been distributors for 25 years until a year ago when it became an associate Boston dealer with the Reo Motor Co. of New England. The Linscott Motor Company will continue at its Brookline Avenue location.

## Federal Begins Canadian Assembly

DETROIT, Sept. 10—Assembly has started in a limited way at the new Canadian assembly plant of the Federal Motor Truck Co. in Windsor. E. R. McKim, who has been distributor for Federal in Windsor, is in charge of the plant.

## M.E.A. Set-Up Shown

(Continued from page 403)

New members received are to be placed in their respective association—the M.E.A. or the M.E.W.A., but are also to be regarded as functioning in the present association from the date he joins to Dec. 31, 1931, without initiation fee or dues or rather charges and with all the rights and privileges of membership in the M.E.A.

Two field representatives and officers and committee members personally interviewed present members to determine how they would react to the division of the association. A total of 370 were interviewed, 338 of whom voted in favor of the change. The tabulation follows:

	(A)	(B)	(C)	(D)
No. interviewed...	87	65	33	185
In favor of new association .....	85	57	27	169
Opposed .....	1	3	1	5
Prefer to withhold decision .....	1	5	5	11
Will join new association .....	86	62	27	175

(A) Present Division A members.  
(B) Present Division B members.  
(C) Present Division C members.  
(D) Total present members interviewed.

## French Imports Drop 65 Per Cent

But Parts For Assembly Were Held Up Well

WASHINGTON, Sept. 9—French imports of complete automobiles during the first half of 1931 numbered 1470 passenger cars and 227 trucks, as compared with 4456 cars and 1114 trucks during the same period of 1930, a decrease of approximately 65 per cent, according to advices to the Automotive Division of the Department of Commerce.

Parts for assembly imported from automotive manufacturing countries decreased to a much smaller extent and are responsible for reducing the total percentage of decrease to about 40 per cent. The second quarter of 1931 proved the most active importing months, accounting for, roughly, two-thirds of the automobiles brought in during the half-year period.

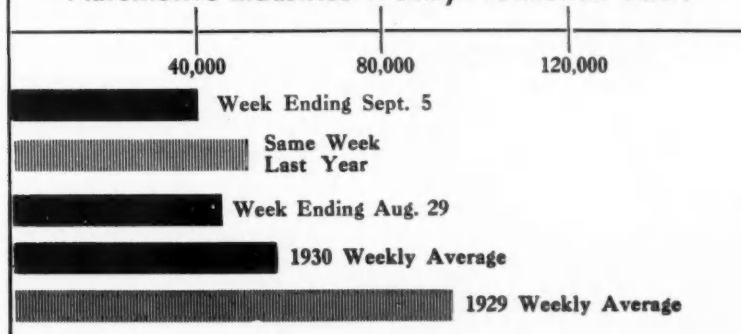
France exported during the same period of 1931 a total of 12,036 passenger cars, 1335 trucks and 2105 chassis, a total of 14,476 units, as compared with a total of 18,134 units during the first six months of 1930 and 21,051 during the same months of 1929. The principal markets for French passenger cars and buses were Algeria, Morocco, Switzerland, Belgium and Luxemburg, Tunisia, Great Britain, Netherlands; for trucks, Algeria, Tunisia, Morocco, Belgium and Luxemburg; for chassis, Algeria, Spain, Belgium, Switzerland, Netherlands, Poland.

A total of 1493 motorcycles were imported, chiefly from Great Britain, Belgium, Germany and Switzerland, while the number exported was 2241, shipped principally to Algeria, Tunisia, and Morocco.

## Russell H. Baldwin

DETROIT, Sept. 10—Russell H. Baldwin, 47 years old, former head of Baldwin Rubber Co., Pontiac, died Wednesday after a long illness.

Automotive Industries Weekly Production Chart



## Lap-Speed Mark Broken in Harmsworth Trophy Race Despite Official Decision of "No Contest"

by Athel F. Denham

DETROIT, Sept. 8—With the "no match" ruling of racing officials yesterday, what promised to be one of the finest of contests ever held for the British International or Harmsworth Trophy race came to an unsatisfactory conclusion. Recriminations will undoubtedly follow from both sides of the water, but the trophy will remain on this side of the water by virtue of Gar Wood's victory last year over Miss Betty Carstairs's Estelles.

Out of the race, however, emerged the conviction that Gar Wood had at last found his match in Lord Wakefield's Miss England II. Only part of Kaye Don's boat's superiority was due to the 4000 hp. available in its Schneider Cup type engines. From all appearances the British boat also seemed to be more manageable on the slightly choppy water Sunday than Wood's Miss America IX, a fact which surprised experts accustomed to assume Wood's superior boat building ability as a foregone conclusion.

However, much of Gar's inability to fully open up his engines—he is credited with having approximately 400 revolutions left in his engines which he could not use—may be due to his having designed the boats for horsepower considerably below those which finally were made available to him this year. Wood's Miss America IX engines, of the Packard 2500 Aircraft type, opened up, and fitted with a Rootes type supercharger built by Schwitzer-Cummins of Indianapolis are said to develop around 1400 hp. maximum against a standard rating for this engine of 800 hp.

Whether or not the Miss America IX could have beaten Miss England II if the boat could have stood the whole power available in its engines is of course still a matter for conjecture, with the argument slightly in favor of the British boat. It is to be doubted that even the fitting of the superchargers on the Packard engines provided the Miss America IX with the additional 10 miles per hour of potential speed needed to equal the known top speed of the Miss England II.

After the second lap Sunday, following the postponement of the first heat from Saturday, Gar Wood apparently resigned himself to the loss of that heat and while still maintaining a speed several miles in excess of the former lap record, dropped down sufficiently to insure his finishing without injury to the craft. It must have become apparent to Gar Wood, however, that unless he could beat the British boat to the line in the second heat, or rather, unless he could beat it to the first turn, the trophy would be defi-

nately lost. Whether or not his anxiety to assure himself of this lead caused his premature start Monday, with Kaye Don on his heels, and the disqualification of both boats under the rules of Union Internationale on Yachting, is a subject being argued widely in this section today.

After the disqualification of the challenger the race of course came to an automatic end, in spite of the fact that the Miss America VIII which hung back for a late start completed the race at an 'ambling' speed of slightly more than 66 m.p.h.

Kaye Don's accident on the first turn was due to his anxiousness to be in a position to overtake the Miss America IX on the back stretch, since he did not know that he had been already automatically disqualified. Cutting in on the last turn at high speed he struck the wash of Gar's boat, upsetting him, without serious injury, fortunately. Except for being badly shaken up and for a bad throat, Don seems to be in pretty good condition. His masterly handling of Miss England in the first heat proved more than sufficient to set at rest the criticisms of Don originating at the time he failed to lift the world's land speed record at Daytona beach last winter.

All three of the boats entered far exceed the former lap speed record for the Harmsworth trophy, Don setting a new record of 93.107 m.p.h. for one lap and 89.913 m.p.h. for the distance of the race, about 14 and 12 miles faster than the previous records—set by Miss America IX last year.

### Service Association Meets

NEW YORK, Sept. 11—The Automotive Service Association of New York held its first meeting of the 1931-32 season last evening at the American Women's Association building. David Beecroft, New York representative of Bendix Aviation Corp., was the speaker of the evening and he outlined the prospects for maintenance business in the future.

E. T. Satchell, president of the Motor and Equipment Association, also spoke, outlining the relation of the parts wholesaler to the service manager. Among the guests of honor who also spoke briefly were Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and Harry G. Bragg, manager of the Automobile Merchants' Association.

### Goodrich Passes Dividend

NEW YORK, Sept. 9—B. F. Goodrich Co. has omitted the regular quarterly dividend of \$1.75 on 7 per cent preferred stock due at this time.

## Ford Assembles In Buffalo Plant

**New Operation Begun With Formal Ceremony; Has 400-Car Capacity**

BUFFALO, Sept. 8—With New York State Attorney General John J. Bennett, Jr., pressing the button that set machines in motion, production in the new assembly plant of the Ford Motor Co. in the Hamburg turnpike formally started last week.

Mr. Ford was unable to be present, but he sent a telegram stating that he knew "of no other expression of confidence in the future of our country and of our business which would be more convincing than the large investment in modern facilities which we have made in Buffalo."

The first car turned out by the new plant was bought by the City of Buffalo, and driven away by Mayor Roesch.

The main building of the new plant is 1000 ft. long and 320 ft. wide, the additional buildings comprising loading docks, steam plant and paint building. It has a capacity of 400 cars daily.

According to W. L. Yule, Buffalo branch manager, this is only the beginning of a much greater development Henry Ford has in mind for Buffalo.

"Mr. Ford has not been content with the 30 acres already developed, but he has acquired 30 additional acres for future development and is negotiating for an additional 40 acres for distant needs," the Buffalo branch manager said.

### Petroleum Imports Flutter

NEW YORK, Sept. 9—Imports of petroleum at the principal ports of the United States for the month of August have been estimated by the American Petroleum Institute at 197,903 barrels daily. This compares with the daily average of 211,903 barrels for the month of July. Imports for the week ended Sept. 5 totaled 260,714 barrels, compared with 170,714 barrels for the week ended Aug. 29.

### Furnish Convention Cars

DETROIT, Sept. 8—Detroit automobile manufacturers are contributing about 200 cars to furnish transportation during the American Legion convention to be held here later this month. Ford and Chevrolet lead with 75 and 50 cars respectively. Others include: Buick 10, Chrysler 9, De Soto, Dodge, Lincoln, Hudson and Hupp, 6 each; Packard 5, and Cadillac 4.

## Bendix Shares Lubrication Co.

### Enters New Subsidiary With Standard Oil of Indiana

CHICAGO, Sept. 8—Formation by the Bendix Corp. and the Standard Oil Co. of Indiana of the Lubrication Corp., which will manufacture and market grease fittings for all makes of automotive and industrial machinery, grease dispensing equipment, automotive lubricants and lubrication service, was announced yesterday by Edward Seubert, president of Standard Oil, and Vincent Bendix, president of Bendix Aviation Corp.

The new company is incorporated in Delaware with a nominal authorized capital of \$200,000, composed of 2000 shares of \$100 par value stock, ownership of which will be divided equally between Standard Oil and Bendix. The name is temporary and will probably be changed later.

A statement issued by officials follows:

"For more than a year, experts have been at work in the Bendix laboratories perfecting and testing new types of fittings and grease guns. These devices are protected by patents, some of which are based on inventions made prior to 1916.

"The outstanding feature of the new devices is that they make the greasing process easier under all conditions and promote more thorough greasing by facilitating the use of pressures higher than those previously employed. An entirely new idea in handling grease has been developed which will revolutionize the greasing phase of automotive servicing.

"Engineers are now at work designing the machine tools to be used in manufacturing the new equipment at the Bendix plant at South Bend, Ind. Chemists of the Standard Oil Company plant at Whiting, Ind., have perfected the formulas which will be used in manufacturing special greases for use in connection with the new system."

Officers and directors of the Lubrication Corporation are: R. P. Lansing, president; M. W. McConkey, vice-president; Bruce K. Brown, vice-president; J. A. Watson, secretary; W. J. Buettner, treasurer, and N. R. Grimshaw and L. C. Welch. A. Y. Dodge is general manager. Messrs. Brown, Grimshaw, Welch and Watson are Standard Oil executives and the remainder are with Bendix.

Bendix engineers have been active in the perfection of other new products. In addition to the new clutch control device and the Startix devices which were recently announced, a flexible metal pipe is being perfected. Pipe of this nature is being used by a great number of companies and it is

said Bendix can manufacture the product at a substantially lower price. Effective Oct. 1 a contract calling for 1000 clutch units a day is announced for sale to a manufacturer of a car sold in large numbers.

### Fewer Enter Olympia Show

LONDON, Aug. 25 (by mail)—The preliminary list of exhibitors at the Olympia passenger car show in October (15-24) shows a drop in numbers as compared with last year, viz., 513 as against 546; last year there was an increase from 495 in 1929, though this was due to the enlargement of Olympia allowing new sections to be arranged, i.e., for service equipment and motor boats.

Among the names of cars previously exhibited but missing from this year's list are: Austro-Daimler, Bentley, Beverley, Chevrolet, Delahaye, Delaunay Belleville, Donnet, Franklin, Imperia, Lea-Francis, Swift and Voison. No new makes are appearing.

The following table shows the totals in the various sections as compared with last year:

Section	1931	1930
Cars	59	75
Coachbuilder	50	54
Tires	15	15
Accessories and Components	276	302
Service and Garage Equipments	78	61
Motor Boats	35	39
	513	546

### Twin Cities Plan Shows

MINNEAPOLIS, MINN., Sept. 8—The annual Northwest automobile show this year is to be put on by the Minneapolis Automobile Trade Association in the Municipal Auditorium, instead of at the State Fair Grounds, as for the last two seasons. Heretofore the show has followed directly the Chicago national show. This year it is to be two weeks ahead of former dates, or Jan. 23-30. The St. Paul association after many years of co-operation will not join. It will have a show of its own in the new St. Paul municipal auditorium unit, Feb. 6-13, under auspices of the St. Paul Dealers, Inc.

### Vesta-Consolidated Sales Increase

CHICAGO, Sept. 8—In the second month following the merger of the Vesta Battery Corp., Chicago, with the Consolidated Battery Corp., Buffalo, the sales were 20 per cent greater than the combined sales of the two companies in the corresponding month of 1930.

### Auto-Lite Battery Sales Up

CHICAGO, Sept. 8—Sales in the battery department of the Electric Auto-Lite Co. during August were 80 per cent greater than those of July and orders on hand for September exceed the sales for August, according to C. O. Miniger, president.

## Steel Market Set For Price Test

### Possibility Exists That Car Industry May Again Lead in Consumption

NEW YORK, Sept. 10—While the rate at which steel finishing mills resumed operations following the holiday was little changed from that which had prevailed preceding it, the barometer of automotive demand shows a slightly rising tendency. A number of orders booked immediately before and after the holiday were interpreted as forerunners of slow improvement in buying over the ensuing fortnight. Although buyers have grown accustomed to very little time being required between issuance by them of specifications and shipment by mills, any speeding up in activities of motor car plants and parts makers in October is certain to be reflected in the bookings of steel makers during the second half of this month.

Statisticians are already beginning to busy themselves with conjectures as to the total 1931 output. In one quarter this is estimated at 27,500,000 tons, as compared with 39,500,000 tons last year and 55,000,000 tons in 1929. In the depression year of 1921 the steel output was slightly more than 19,000,000 tons. It is thought that automotive consumption continues to absorb more than one-sixth of all the steel made; and with the building industry as backward as it is, it is highly probable that, when the time comes for closing the steel industry's 1931 records, automotive consumption will again lead all other consuming outlets.

The market continues to be characterized as firm by sellers. In fact, there is the usual gossip of further price advances being on the program for later in the year, but it is only now that recent advances can be expected to have a real test and developments from now on will be closely watched by buyers.

**Pig Iron**—Prices continue nominally unchanged with the market easy. Demand is chiefly for small lots for immediate shipment.

**Aluminum**—Quiet and unchanged. **Copper**—There is talk of further curtailment of mine output being contemplated by leaders of the industry. The market is quiet and unchanged.

**Tin**—Unsettled as the result of further weakness in London.

**Lead**—Weak and lower.

**Zinc**—Dull.

### Allis Orders Off

CHICAGO, Sept. 8—Unfilled orders of the Allis-Chalmers Corp. Aug. 31 totaled \$8,700,000 as against \$8,900,000 on July 31 and \$16,239,000 on Aug. 31, 1930. A five-story addition to the company's administration building, of its tractor division, will soon be under construction. The new addition will cost about \$125,000 and was made necessary following acquisition of the Advance-Rumely Corp.

# Fuel Pumps Need Auxiliary Aid on British Schneider Cup Planes

(Continued from page 406)

first contest after the war, which was held at Bournemouth, England, was declared void because of fog. In 1924 also there was no contest, as no challengers appeared and the United States waived its right to claim a victory by merely flying over the course. The last previous race was held at Spithead and the Solent in 1929 and was won by Great Britain.

Under the conditions of the contest the trophy is won outright by any national club which wins the contest three times in five years. Great Britain was the only country standing a chance of winning the trophy outright this year. Notwithstanding this fact, the British Air Ministry shortly after the last previous race had decided not to compete again. It was stated at the time that the Ministry felt its objects in promoting the development of high-speed craft had been achieved, and that it would leave further participation in competitions to the industry. Later, however, this decision was rescinded, and it now appears that this volte face was brought about by an offer of a wealthy lady (Lady Houston) to contribute £100,000, or nearly half a million dollars, toward the expense. In a note recently issued on the subject of the race by the Press Section of the British Air Ministry it was stated that "the extra expenditure incurred this year by the Air Ministry on aircraft and engines, and in other directions, will be met from the sum of £100,000, which Lady Houston has generously provided for the purpose."

## Three Countries Had Entered

Three countries entered teams for the race this year, viz., England, France and Italy. In each case the planes were ordered by the Air Ministry of the country they were to represent, and they were to be flown by pilots of the respective air forces. The British team consisted of eight Royal Air Force officers and a number of Royal Air Force mechanics. In the preparations for the race they were assisted by members of the staffs of the firms concerned in the production of the planes and engines.

The British team had the following craft at its disposal during the training period: Two Vickers Supermarine Rolls-Royce S6B (the official name of a plane built this year); two Vickers Supermarine S6A (the new name for the modified S6 plane originally built for the 1929 race); two Supermarine-Napier S5; two Gloster-Napier S6, and one Gloster-Napier 4A. One of the reasons for modification in the S6A plane was that the rules had been altered; the preliminary trials this year formed part of the contest proper and made it necessary for the craft to carry more fuel than in 1929.

Owing to the fact that British participation in the 1931 race was not assured till the end of January this year, there was insufficient time to build and test out aircraft designed on novel lines. The best that could be done under the circumstances was to work on the basis of the successful 1929 designs, and, given increased horsepower from a considerably developed Rolls-Royce racing engine, to seek greater speed from detail improvements. Although thus handicapped, R. J. Mitchell, chief designer of the Supermarine Aviation Works (Vickers), Ltd., was able to achieve important modifications.

The entire upper and lower surfaces of the wings and the upper surfaces of the floats constitute water radiators. These surfaces are built of a double skin of duralumin, the hot water from the engine cylinder jackets circulating in the space between and being cooled by the flow of air over the exterior of wings and floats.

## Lubricant Carried in Fin

Lubricating oil is carried in the tail fin and moves between the engine and the fin through three oil coolers extending along most of the side of the fuselage. Research work at the Royal Aircraft Establishment, Farnborough, and at the Supermarine Aviation Works has made it possible to increase the capacity of the oil coolers by about 40 per cent while retaining the same external area and arrangement of cooling surface as was employed in the 1929 machines. The improvement resulted from a special form of internal construction of the coolers which conveys heat from the oil rapidly to the outer surface, where it is dissipated.

With the engine running at normal temperatures no less than 40,000 B.t.u. must be dissipated each minute from the water and oil cooling surfaces, equivalent to approximately 1000 hp.

No problem in the design of modern racing seaplanes is more difficult than the provision of sufficient surface for cooling purposes. Practically all the external surface of the airplane is used for heat dissipation; in other words, the radiator surface provided is nearly equivalent to the entire external surface of the wings, floats, tail fin and the fuselage sides.

## Floats Hold Fuel Supply

Fuel is carried inside the floats and is forced by engine-driven pumps to a small pressure tank in the fuselage, which feeds it direct to the engine. On steeply banked turns the sudden application of severe centrifugal loads, equal to five or six times the force of gravity, prevents the fuel pumps from operating and the small pressure tank carries just sufficient fuel to keep the engine running during each turn. Im-

mediately the turn is concluded the pumps begin to operate once more and the pressure tank is replenished.

The starboard float carries considerably more fuel than the port float, the difference in load balancing the tremendous turning moment of the engine, particularly during the take-off. Full engine torque has the effect of transferring a load of approximately 500 lb. from one float to the other, a factor so important that it is doubtful whether the aircraft could be lifted off the water with a very light load of fuel on board.

"Drag," or air resistance, of the floats was markedly diminished and the take-off characteristics improved in the 1931 machines. Extensive tests with models in the Vickers experimental tank at St. Albans, and the wind tunnel at the National Physical Laboratory, produced a form of float which is said to combine the required aerodynamic and hydrodynamic qualities to the highest degree.

Construction of the new floats was complicated by the necessity of fitting water-cooling radiators on the whole of the upper surfaces. When filled with water from the engine at a temperature near the boiling point, the radiators expand nearly half an inch, and to prevent buckling of the outer skin an elastic framework, able to take up this expansion, was devised. It was also found essential to insulate the fuel tank from the water-cooling surface to prevent evaporation of the fuel.

The Vickers Supermarine Rolls-Royce S6 racing seaplane is a low-wing monoplane of the twin-float type, built entirely of metal. Its principal specifications are as follows:

Span .....	30 ft.
Chord .....	5 ft. 8 in.
Wing area .....	145 sq. ft.
Length overall .....	27 ft. 9 in.
Height overall .....	12 ft.
Weight empty .....	4030 lb.
Pilot .....	160 lb.
Fuel (115 gal.) .....	960 lb.
Oil (10 gal.) .....	100 lb.
Weight fully loaded .....	5250 lb.
Wing loading .....	36.2 lb./sq. ft.
Power loading .....	2.76 lb./hp.
Engine weight .....	1535 lb.

## Accidents Mar Trials

Preparations for the race this year resulted in a number of fatal accidents. On Aug. 18, Lieut. Brinton, the youngest of the British contest pilots, was killed, while taking off in the rebuilt 1929 racer. Just after rising from the water the machine dived into the sea, and the pilot was forced into the tail end of fuselage by the pressure of the water, where he was found after the craft had been dragged ashore. Two other fatal accidents to prospective competitors had occurred earlier, and France and Italy had both lost a famous pilot.

## Morris Program Adds a Model

### Four-Cylinder Four-Door Bodies Will Distinguish It

LONDON, Aug. 29 (by mail) — A prominent feature of the new Morris programme announced today is the adoption for all sedans and other closed bodies of a curved front end of the roof, in place of the projecting peak or visor; the curve runs sharply upward rearward from the top of the sloping windshield. The name "eddy-free" has been applied to this style of bodywork, and it is claimed that besides reducing wind resistance it reduces to an appreciable extent the noise ordinarily arising from the abrupt disturbance and diversion of air currents impinging upon the windshield.

Four-speed transmissions with twin-top (helical) third speed are an innovation for Morris on all six-cylinder models. A new four cylinder model is introduced, termed the Family Eight. It has a wheelbase (91 in.) which is 12 in. longer than the Morris Minor and correspondingly roomier bodies for four adults, with four doors instead of two, and six lights. The engine is the 847 cc. overhead camshaft job originally used on the Minor, but the latter now has the side valve 847 cc. engine of the £100 Minor produced last spring.

The Cowley Four (1550 cc.) is continued with roomier bodies and a redesigned engine, Lockheed brakes and a new radiator design that is adopted for all 1932 Morris cars. The Major Six is lengthened and has a new engine of smaller tax rating and cubic capacity to give it a stronger appeal in the Economy Six class; the rating is now 14 hp. and the piston displacement 1803 cc. The "Oxford Six," like the "Major" and the "Isis" has the new four-speed gearbox and among additional equipment are radiator shutters. The largest of the range, the "Isis Six," has new bodywork and is a much more imposing car than hitherto.

Representative prices for 1932 compared with 1931, where comparisons are possible, are:

Sedan Models	1932	1931
Minor .....	£122	£140
Family Eight .....	152	
Cowley Four .....	180	185
Major Six .....	199*	215†
Oxford Six .....	265*	285†
Isis Six .....	350*	340†

\*Four speeds. †Three speeds.

## Casing Shipments Off

NEW YORK, Sept. 9—Shipments of pneumatic casings for the month of July amounted to 5,461,908 casings, a decrease of 2.0 per cent under June this year and shows a negligible change, as compared with July, 1930,

according to statistics released by The Rubber Manufacturers Association, Inc.

The organization reports production of pneumatic casings for July to be 4,926,484 units, a decrease of 13.2 per cent, as compared with June this year, although 23.4 per cent over July a year ago.

Pneumatic casings on hand July 31 amounted to 9,919,456 units, a decrease of 5.1 per cent under June and 16.0 per cent below July 31, 1930.

## Plans English-French Lexicon Of Automotive Terms

NEW YORK, Sept. 9—A comprehensive English-French technical dictionary of the automotive and allied industries, compiled by Lewis S. Sell, Ph.D., and containing more than 60,000 technical terms in each language, will shortly be published by the International Dictionary Co., 15 Park Row, New York. The mechanical idiom of England, France and the United States will be collated, and particular emphasis will be placed on a practical and theoretical nomenclature of the internal combustion engine, according to the publisher.

In the preface to the contemplated work the following acknowledgement will be made: "Much use has been made of the concise and systematic works of P. M. Heldt [engineering editor, *Automotive Industries*], who also lent the aid of his great knowledge in unraveling the meanings of some of the knotty points in the French manuals."

## New England Section Meets

BOSTON, Sept. 9—Morgan T. Ryan, motor vehicle registrar of Massachusetts, was the speaker at the opening meeting of the 1931-32 season of the New England Section, Society of Automotive Engineers, here this evening at the Hotel Kenmore.

## Industry Suffers

(Continued from page 389)

sand entrained in water. The soft rubber lasted for a year, whereas the hard iron had worn out in a few weeks.

This physical principle with which we are all so familiar forms the basis not only of the philosophy of Christ, but is the genesis of many other Eastern philosophies—"Whosoever shall smite thee on thy right cheek, turn to him the other also"; "A soft answer turneth away wrath." Witness the present triumph of Mahatma Gandhi of India, who has opposed the aggression of British rule by a simple policy of non-resistance.

We might go on almost indefinitely, pointing out the interesting relationships between certain eternal verities in the realm of physical law and the behavior of human beings, and the dynamics of money matters.

## G. M. Sold 69,876 Units in August

### Declined From July Figure The Month's Total

NEW YORK, Sept. 8—General Motors dealers sold 69,876 cars to consumers during August, according to figures announced by the corporation today. This compares with 86,426 for August of last year, and with 85,054 in July of the current year. August of last year showed an increase over July, as compared with a decrease in August of this year, when compared with July.

However, it will be recalled Buick introduced its new models about the first of August last year, but is postponing its new model introduction this year until the time for the national shows. This probably is, at least partially, responsible for the decline in August sales this year.

Manufacturing divisions of General Motors sold 62,667 cars to dealers in the United States, as compared with 76,140 in August of last year and with 78,723 in July of this year.

Total sales to dealers throughout the world, including Canadian and overseas shipments, were 70,078, as compared with 85,610 in August of last year, and with 87,449 in July of the current year.

## Asks Voluntary Inspection

HARRISBURG, PA., Sept. 9—Although the Commonwealth of Pennsylvania will not have an official inspection of motor vehicles during the autumn of 1931, the commissioner of motor vehicles is appealing to owners in the state to voluntarily have their vehicles inspected regularly. For the pending official inspections to take place a few months hence, 7500 applications have been mailed to service stations, garages, etc., which are eligible to become official inspection stations.

## Plans Regional Meetings

PONTIAC, MICH., Sept. 9—In place of a national sales meeting in Pontiac, General Motors Truck Co. is reported to be planning regional and zone sales meetings throughout the United States, to be held during the next 30 days or so. Factory units will travel to the various meetings to outline the program for the coming months.

## Adopts Cash Discount

CHICAGO, Sept. 9—Caterpillar Tractor Co. announces a new policy whereby the company will allow two per cent cash discount from its published factory list to cash buyers of Caterpillar machines.

## Industry Employs 3.7 Per Cent of All

Census Shows Number of Workers in Automotive and Allied Activities

WASHINGTON, Sept. 10—Automobile factories employed 640,161 workers on April 1, 1930, returns of the Bureau of the Census show. Automobile repairshops employed 257,746; garages, automobile laundries and greasing stations, 423,975, and automobile agencies and filling stations, 505,322. Combined, employment in the automotive field and related units was 1,827,204. This was 3.7 per cent of the total of 48,832,589 workers 10 years of age and over gainfully employed.

The report showed that of the whole number of gainful workers, 38,053,795 were males, forming 76.2 per cent of the male population 10 years old and over, or 61.2 per cent of the total male population of 62,137,080. The 10,778,794 female gainful workers formed 22.1 per cent of the female population 10 years and over, or 17.8 per cent of the total female population of 60,637,966.

Distribution of male and female employment in the automotive and related industries follows:

	Male	Female
Automobile factories .....	594,889	45,272
Automobile repairshops...	253,769	3,977
Garages, automobile laundries and greasing stations .....	408,934	15,041
Automobile agencies and filling stations .....	472,120	33,202

## Defiance Enters Canada

LONDON, ONT., Sept. 8—Canadian division of the Charles E. Santo Co. has been established at London, Ont., as the first step toward manufacturing in Canada, for the purpose of supplying the automotive accessory trade with Defiance spark plugs and Defiance spark plug testers, manufactured by Defiance Spark Plugs, Inc., Toledo.

## + + CALENDAR + + OF COMING EVENTS

### SHOWS

Olympia Passenger Car Show, London .....Oct. 15-24  
Olympia Truck Show, London...Nov. 5-14  
Passenger Car Show, Glasgow...Nov. 13-21  
Motorcycle Show, London...Nov. 30-Dec. 5

### CONVENTIONS

Eastern States Exposition, Springfield, Mass. ....Sept. 20-26  
American Welding Society, Boston, Mass. ....Sept. 21-25  
American Electric Railway Assn., Atlantic City, N. J. ....Sept. 26-Oct. 2  
S.A.E. National Production Meeting, Detroit .....Oct. 7-8  
National Safety Council, Chicago, Ill. ....Oct. 12-16  
Society Industrial Engineers, Pittsburgh, Pa. ....Oct. 14-16  
Transportation Meeting, S.A.E., Washington, D. C. ....Oct. 27-29  
American Chemical Society, Buffalo, Aug. 31-Sept. 4  
American Society Mechanical Engineers (General Meeting), Kansas City .....Sept. 7-9  
W. Va. Motor Transportation Assn., Charleston .....Sept. 11  
Society for Elec. Development, New York City .....Sept. 11  
Steel Founders Society, Chicago...Sept. 17  
American Institute Mining and Metallurgical Engineers—Iron and Steel Division, Boston .....Sept. 21-24  
American Society for Steel Treating (National Metal Exposition), Boston .....Sept. 21-25  
American Society Mechanical Engineers—Machine Shop Practice, Boston .....Sept. 21-26  
American Gear Mfg. Assn., Pittsburgh .....Oct. 15-17  
National Hardware Assn., Chicago, Oct. 19-22  
American Iron and Steel Institute, New York City .....Oct. 23  
American Railway Assn.—Motor Transport Division, Chicago.....Oct. 27-28  
American Society Mechanical Engineers—Annual meeting, New York City .....Nov. 30-Dec. 4  
American Roadbuilders Association, Detroit, Mich. ....Jan. 11-14, 1932

## Dominion Group Changes Name

Trade Organization Will Now be Known as Canadian Automobile Chamber

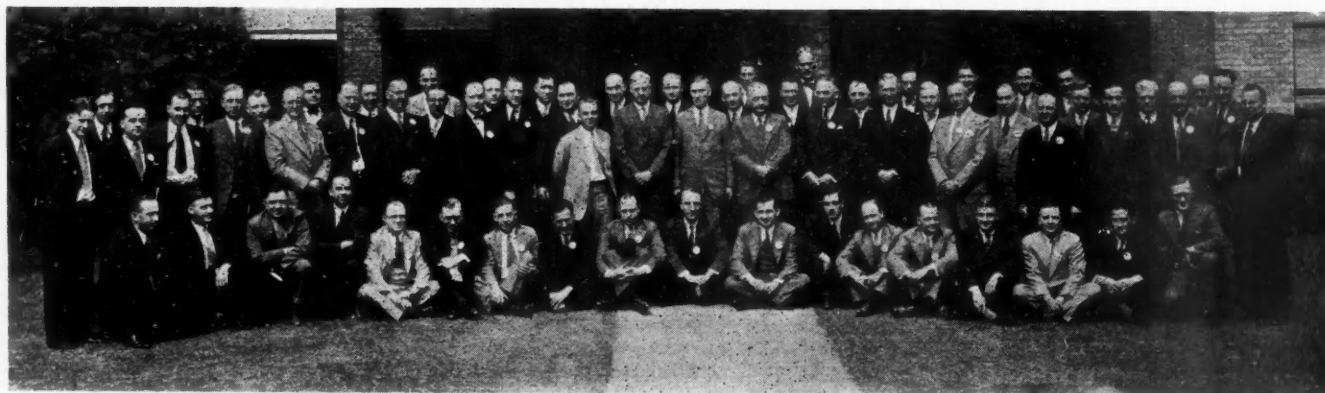
TORONTO, Sept. 8—At a recent meeting of the directors of the Canadian Auto Manufacturers and Exporters Association it was decided to change the name to that of Canadian Automobile Chamber of Commerce. The function of this association parallels that of the National Automobile Chamber of Commerce in United States, and it was felt that the adoption of the new name would be more descriptive of the association's activities. The members of the Canadian Automobile Chamber of Commerce are: Chrysler Corp. of Canada, Ltd.; Dominion Motors, Ltd.; General Motors of Canada, Ltd.; General Motors Trucks and Coach of Canada, Ltd.; Studebaker Corp. of Canada, Ltd., and Willys-Overland, Ltd. D. R. Grossman of Studebaker Corp. of Canada is president; T. A. Russell of Willys-Overland is vice-president, and J. L. Stewart is general manager. The offices of the Canadian Automobile Chamber of Commerce are located at 1006 Lumsden Building, Toronto, Ont.

## Perfect Circle Pays Extra

CHICAGO, Sept. 8—Directors of Perfect Circle Co., Hagerstown, Ind., have declared an extra dividend of 25 cents a share, payable Oct. 1 to stockholders of record Sept. 20. This is in addition to the regular quarterly dividend of 50 cents a share, payable on the same date.

## Auburn Declares Dividend

CHICAGO, Sept. 8—Directors of Auburn automobile have voted to pay the regular dividend of \$1 a share and the usual additional dividend of 2 per cent in stock.



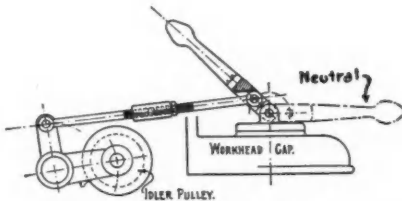
Before beginning, on Sept. 1, a new sales plan under which Motch & Merryweather, machine tool sales agents in Cleveland and Detroit, and Marshall & Huschart, Chicago machine tool dealers, would be directly associated with Kearney & Trecker factory branches in the respective cities, a sales convention of representatives of the three organizations was held at the K & T plant in Milwaukee, Aug. 30 and 31. The convention delegation, headed by E. R. Motch, Stanley Motch, and J. R. Porter, is shown above with Kearney and Trecker officials.

# NEW DEVELOPMENTS

## Automotive Parts, Accessories and Production Tools

### Heald Neutral Position For Workhead

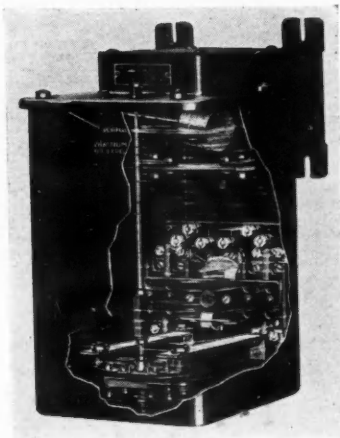
A new type of neutral arrangement for the workhead spindle has recently been developed by The Heald Machine Co., Worcester, Mass. The ability to free the workhead from its driving mechanism, so it can be turned by hand, is of great value in setting up a machine, and is almost a necessity when balloon type fixtures are used. This attachment is said to be rapid and simple to operate. It consists of a lever coupled to the arm carrying



one of the workhead belt idlers in such a way that pulling the lever outward and downward slackens the belt sufficiently to allow the workhead spindle to turn free. The hand lever is mounted so that it goes beyond center, holding the idler down against the tension of the idler spring. This type of neutral is applicable only to two motor drive No. 72A Heald Internals.

### Explosion Proof A. C. Starter

An explosion-proof, across-the-line, automatic starter for A.C. squirrel-cage induction motors is announced by Cutler-Hammer, Inc., Mil-



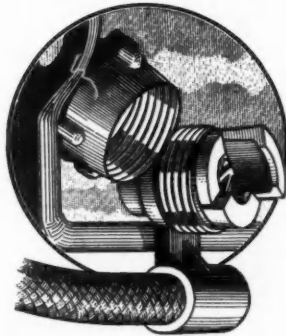
Automotive Industries

waukee, Wis. Distinguishing this starter from similar explosion-proof equipment is the immersion in oil of its new thermal overload mechanism. Another improvement is the newly designed thermal overload mechanism. It is designed in keeping with the latest requirements of the Underwriters Laboratories for Class 1, Group D, Hazardous Locations. Briefly, this includes installations where Duco, lacquers, gasoline, alcohol, etc., are present in the atmosphere.

### NewType Battery Connector

The NewType Connector Corp., New York, has placed on the market a new universal battery connector of which an illustration is shown herewith. The connector is finger-operated and is claimed to be non-corrosive and to make contact with the terminal post all around.

Okocord cable in No. 1 size is used for these connectors. This cable con-



sists of 19 ropes of seven strands each. The connector is die-cast onto the cable, and this is said to be a new application of the die-casting art. Prior to casting the cable conductor end is spread, and as the connector cable sleeve is cast into this end, complete electric contact is obtained. The lead-base metal used in the connector sleeve forms a solid, integral connector-to-cable attachment for which it is claimed that it cannot loosen. The cable conductor end and  $\frac{1}{8}$  in. of insulation are completely covered. This gives a nicely finished appearance and is said to prevent all corrosive action at this point.

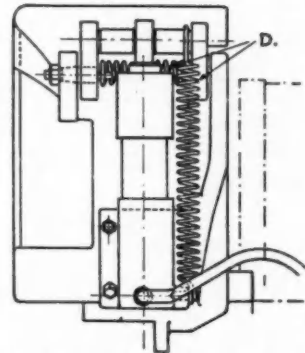
The complete NewType connector unit (assembly) consists of a tapered barrel with cable sleeve, three tapered terminal jaws and a cap. The barrel and cap are the same size for the positive and negative terminal posts. The only difference in the complete

unit is in the size of the terminal jaws. Thin jaws are used for positive connector units and thick jaws for negative units.

### Automatic Chuck Guard

On high production internal grinding, Heald always endeavors to furnish fixtures which load from the front, obviating the necessity of opening the chuck guard each time a piece is loaded. In some cases, however, side loading balloon type fixtures are furnished either through necessity or on account of a distinct preference on the part of the customer and accordingly production may suffer because of the increase in handling time due to having to open and close the chuck guard.

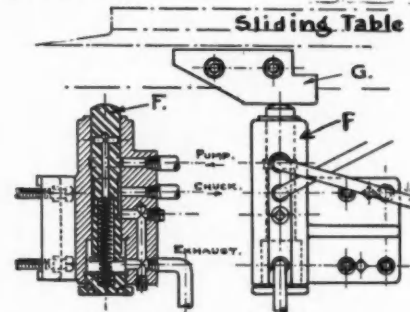
To eliminate this loss and effect a saving in cost per piece on this type of work, The Heald Machine Co., Worcester, Mass., has developed an auto-



matic chuck guard which is applicable to all Heald No. 72A Internals where a standard guard is used. It can be readily applied to machines already in the field.

Referring to the accompanying sketch, the operating means consists of a valve "F," a cam "G," and an oil cylinder on the back of the chuck guard. The valve "F" is normally held open by a spring, allowing pump pressure to be exerted against the piston. This holds the guard closed against the pressure of the springs "D."

When the table runs out to rest position, the valve is depressed by the cam "G," allowing the oil to exhaust from the cylinder and the springs "D" to open the guard. Reversal of the table and release of valve "F" allows pump pressure to automatically close guard.



(Turn to page 414, please)

# NEW DEVELOPMENTS

## Automotive Parts, Accessories and Production Tools

### Monroe Announces Ride Selector

The Monroe Auto Equipment Co., Monroe, Mich., announces a new "ride selector" combined with its hydraulic shock eliminator and operated from the driver's seat of the automobile. The control lever is mounted on the instrument panel, and while it has only three principal settings, it is possible to obtain almost any degree of

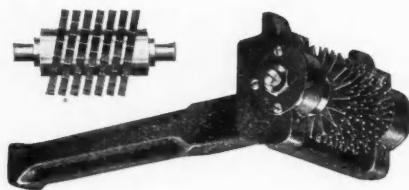


adjustment. An advantage resulting from the installation of the ride selector aside from securing an adjustment most suitable for the particular roads conditions is that it prevents body swaying and weaving, thereby giving the occupants of the car a new sense of security.

### Desmond Heavy Duty Wheel Dresser

A heavy-duty dresser for grinding wheels is the latest addition to the line of the Desmond-Stephan Mfg. Co., Urbana, Ohio. It is especially designed for dressing large and coarse grinding wheels, particularly those high-speed wheels bonded with Bakelite and hard rubber.

The cutters are of tool steel and set at an angle which produces a shearing action in addition to the usual rotary action. The cutter spindle is mounted on dust-proof ball bearings, insuring maximum of service and easy operation. The handle is heavily constructed and will withstand rough usage. Cutters may be easily and quickly changed and there is provision for taking up any end play in the cut-



ter spindle. This dresser will operate equally well on either silicate or vitrified wheels, in addition to the Bakelite and hard-rubber-bonded wheels.

### Union Electric Power Chuck

An electric motor-driven power chuck for lathes has been added by the Union Mfg. Co., New Britain, Conn. It is a patented chuck of the wedge type, the body being of forged steel with a one-piece hardened steel face which also forms ways for the master jaws. The jaws have the full range of the chuck with  $\frac{3}{8}$  in. movement of each jaw and the top jaws can be stepped along on the master jaws to the full diameter of the chuck. This does away with the necessity of having many sets of extra top jaws. This chuck is accurate within 0.001 in. and pieces can be chucked and re-chucked within their original accuracy.

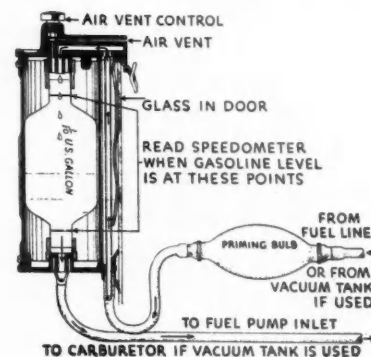
Drive is by a special high torque motor, 1800 r.p.m., 3 phase, 60 cycle 220 volts. Any standard voltage can be furnished. The motor drives the chuck through a reduction gear which operates a nut in draw bar attached to the wedge. The wedge operates the jaws directly. Chucking time is approximately  $1\frac{1}{2}$  seconds. Power developed at the jaws is from 10,000 to 12,000 lb. pressure. The electrical equipment exclusive of the chuck can be used on any type of air-operated

chuck where any user has air chucks which he desires to change over to electric, due to its low cost of operation.

### Penberthy Mileage Tester

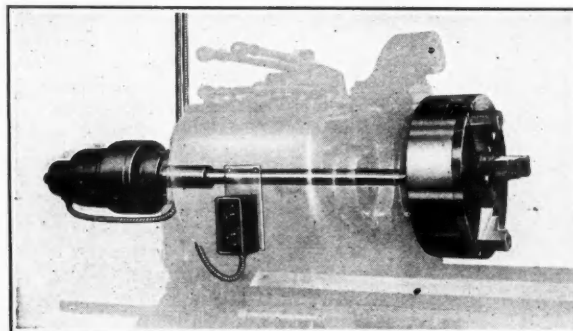
A mileage tester for determining the fuel consumption of gasoline vehicles is manufactured by the Penberthy Injector Company of Detroit. This device is hooked to the floor glass of the car, a leather strap being used as a cushion. Vacuum cups attached to the tester and pressed against the glass hold the tester firmly in place. The windshield of the car is then opened sufficiently to permit of passing through two rubber tubes connected to the tester. The fuel line is then broken at the inlet to the pump, or at the carburetor if the car has vacuum feed, and the rubber tube with a bulb in it is connected to the fuel line, while the other one is connected to the pump or the carburetor.

All gasoline flowing to the carburetor must now pass through the tester. The vent on the tester is now

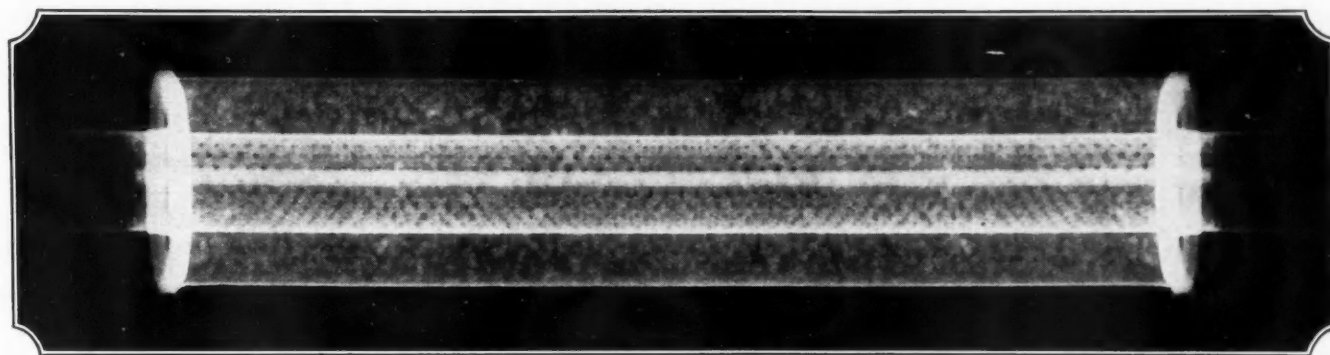


opened and the glass measuring container is filled with gasoline by means of the rubber bulb. The vent is then closed and the car started. When the test is to be started the vent is opened, and the trip mileage is then read when the gasoline level coincides with the upper and the lower graduation marks respectively. The difference between the two readings multiplied by ten then gives the number of miles per gallon.

(Turn to page 416, please)



# Don't Compromise Power Loss To Obtain Efficient Silencing



*Radiograph Courtesy General Electric X-Ray Corporation*

*The above Radiograph (not retouched) shows the straight-through construction of the Burgess Full Power Muffler. It clearly shows the perforated inner tube through which the exhaust gases pass without restrictions thus eliminating back-pressure upon the motor. The noise of the engine explosions expands through the small perforations in the inner tube into the sound absorbing material which is completely encased with an outer metal shell.*

**B**URGESS Straight-thru Muffler Construction gives the engineer greater leeway in delivering that added horsepower—that added mile per hour, top speed *plus satisfactory silencing.*

Increased engine output—as much as seven horsepower saved—has resulted in the standardization of Burgess Full Power Mufflers on many of America's finest cars. This same accomplishment can be made for you.

Burgess Full Power Mufflers cause no more back-pressure than an equivalent length of straight pipe, yet their silencing ability is pronounced.

Burgess engineers specialize in the study of noises in automobiles, aeroplanes, air ducts, buildings, ventilators, motor boats, —in fact, acoustics in general. Our engineers are ready to help solve your noise problems.

## **BURGESS BATTERY COMPANY**

111 WEST MONROE STREET  
CHICAGO

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# BURGESS

ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

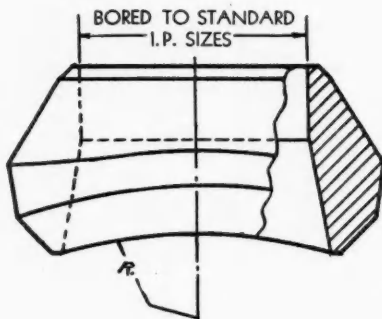
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# NEW DEVELOPMENTS

## Automotive Parts, Accessories and Production Tools

### Bonney Weldolets and Thredolets

Drop-forged weldolets and thredolets are being offered by the Bonney Forge & Tool Works, Allentown, Pa., for welded tee junctions in piping. The illustration shows a weldolet. They are designed to make tee joints easily, quickly and economically. They are individual fittings, designed to be installed simply by



welding to the main line, using a fusion or vee weld, then removing the button and completing the junction by welding or screwing the branch pipe to the outlet. Turbulence and friction are said to be reduced by the funnel-shaped outlet, which allows an unrestricted flow from the main pipe into the branch.

### Celoron Silent Gears for Factories

Time tested in automobile engine construction, Celoron gears are being introduced in the field of factory equipment by the makers, Continental-Diamond Fibre Co., Newark, Del. Chief claims for Celoron gears are: quietness, long life and water-proof qualities. Celoron is manufactured by impregnating sheets of woven fabric such as cotton duck or linen with a synthetic resin, superimposing one sheet upon another until the required thickness is attained and then subjecting the entire mass to accurately controlled pressure and heat in powerful hydraulic presses.

Gears are frequently used in places where lubrication is either difficult or likely to be neglected, and for such applications either Grade C or Grade L may be had impregnated with graphite. The graphite lubricating

agent is introduced when the fabric is impregnated with the synthetic resin and is thoroughly distributed throughout the sheet.

Typical machine-tool applications and various design data are given in a new book available on request.

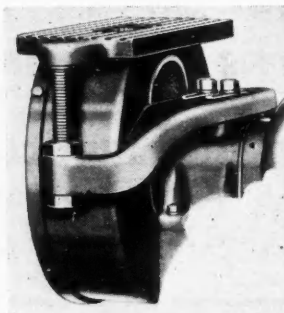
### B & S No. 4 Geared Pump

The Brown & Sharpe Mfg. Co., Providence, R. I., has added the No. 4 pump of larger capacity than the Nos. 1, 2, and 3 Geared Pumps in their regular line. This pump has a capacity of 15 g.p.m. at 500 r.p.m. with a corresponding increase in discharge of 3 g.p.m. for each 100 r.p.m. increase up to a maximum of 30 g.p.m. at 1000 r.p.m. Suction and discharge ports of 1 1/4 in. pipe size provide for the most favorable handling of this volume of liquid.

The No. 4 Pump is of the same design and construction as the other pumps made by this manufacturer. It is particularly adaptable as a coolant pump for machine tools. For larger machinery it makes a very efficient lubricating pump.

### Hisey Surface Grinding Attachment

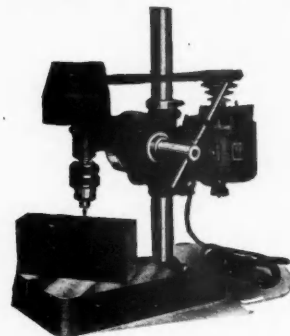
A surface grinding attachment for Hisey machines has been announced by The Hisey-Wolf Machine Co., Cincinnati, Ohio. It is interchangeable as a unit with the standard wheel guard equipment, and can be mounted on either right or left side of the machine.



The table is adjusted to wear of wheel through two square thread screws rigidly locked in place by means of two opposed nuts. The guard cover is readily removable for replacement of wheel. Both the guard and cover are of steel. The table is 10 x 21 in. and is self-cleaning.

### Buffalo 13 1/2 in. Simplex Drill

Meeting the requirements for a versatile drill, the Buffalo Forge Co., Buffalo, N. Y., has placed on the market the 13 1/2-in. Simplex drill with four spindle speeds: 855, 1210, 2380 and 3400 r.p.m. The entire head of the drill travels up and down the column. The spindle is stationary and forms part of the head. It is counterbalanced perfectly and can be easily moved in either direction with the little finger.



The ball-bearing spindle spins freely and only requires lubrication once a month. Spindle pulley is properly guarded. Another feature is the four-step "sheave" pulleys with the heavy type V-belt which gives tremendous pulling power without any slip at all speeds.

Can be supplied with either 1/6 or 1/4 hp. motor. A switch built in to motor with non-breakable rubber plug and cord is standard equipment. Bench space required, 10 x 9 in. Net weight, 83 lb.

### Langelier Swaging Machine

A new line of swaging machines incorporating many radical improvements is now being offered by the Langelier Mfg. Co., Providence, R. I.

The spindle which is now mounted on Timken bearings produces improvements in the operation of the machine. Not only does this feature reduce power consumption, but decreases friction and lengthens life of parts, as compared with the old style plain bearing mountings, as well as providing the ideal condition of close concentricity between the revolving spindle and the circle of head rolls.

Considerable research work was done to determine the best possible range and capacities for these machines. The complete line consists of eleven different sizes of machines having capacities from 3/16 in. diameter work on the smallest to 9 in. diameter on the largest swager. The first five machines of 3/16 in., 1/4 in., 3/8 in., 1 1/2 in. and 1 3/4 in. maximum tube capacity have standard die lengths of 1 in., 2 in., 3 in. and 4 in. respectively. Die lengths for the larger machines

(Turn to page 418, please)

Noise in an automobile body is caused either by friction or by loose parts. To be silent, and to stay silent, therefore, a body should have no joints—no parts to rub together or work loose. In the one-piece body, Budd eliminates joints by the extensive use of flash welding—makes this body of but eight major parts, flash-welded into a single jointless unit. Result: a degree of silence unequalled in any other type of body.



# ★ BODIES BY BUDD ★

Originators of the All-Steel Body. Supplied to Manufacturers in the United States, Great Britain, France, Germany.

*Automotive Industries*

*September 12, 1931*

# NEW DEVELOPMENTS

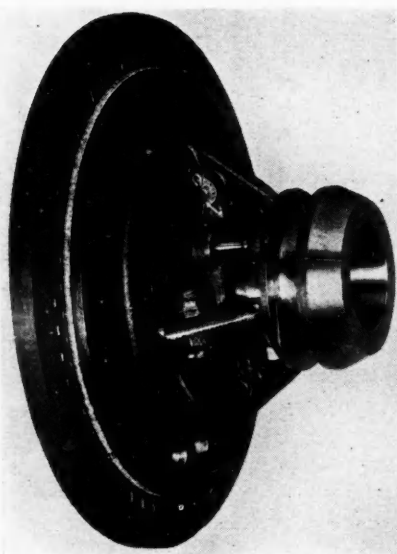
## Automotive Parts, Accessories and Production Tools

are furnished to suit customers' requirements.

The three larger size machines of 5 in., 7 in. and 9 in. maximum tube capacity can be furnished either with Timken bearing spindles or with plain bearings. The plain bearing type for these three machines, however, has bronze bushings in the head and an outboard bearing with the flywheel mounted between the two.

### Twin Disk Heavy Duty Clutch

In certain heavy-duty clutch installations it is necessary to take into consideration the effect of centrifugal force on the clamping member. This holds true, for instance, when the clamping mechanism revolves with the driving member and therefore rotates continuously. In that case the operating mechanism of usual construction will tend to move radially outwards, similar to the flyballs of a governor, and this will tend to partially perform the operation of closing the clutch, thereby causing drag of the clutch plates, and consequent wear.



To overcome this, the action shown, of the New Twin Disk C. R. type, was designed by the Twin Disc Clutch Co. of Racine, Wis., under the conditions previously outlined. Centrifugal force will cause the inner ends of the levers to fly outwards and this in turn will apply tension to the toggle links, which are connected to the clamping

plate. It follows therefore that the greater the action of centrifugal force, the greater will be the pull tending to draw the clamping plate away from the friction discs, or driving plate.

It will be further noted that when the clutch is being operated to engage it, the initial movement of the clamping plate will be comparatively fast, but as it reaches its closed position it slows down, due to the straightening of the toggle links, which now exert their maximum pressure. Provision is made to carry the links over center, and the inner ends of the levers are also moved beyond the true radial line, in order to insure a locked engaged position.

When releasing the clutch, the first movement is a very powerful one, insuring the breaking loose of the plates, and this is followed by a more rapid motion to the position of full release. Adjustment is performed in the usual manner, and the levers are operated by a simple form of sliding sleeve. It will be obvious that this design is excellently adapted for duplex installations, and for a given diameter and applied power, it will transmit greater torque than the usual construction.

This clutch while originally designed for heavy work—in the oil fields—is ideally adapted to any type of heavy duty equipment such as locomotives, cranes, shovels, etc.

### "Liquilox" Protective Coating

"Liquilox," a new liquid protective coating containing no dyes, lamp black, rosin, asphalt, gilsonite, vegetable or animal oils, and offering protection against acids, alkalis, salts, indirect heats (from 1400 to 1500 deg. Fahr.), waters, barnacles, termites, and miscellaneous destructive forces that deteriorate woods, fabrics, metals, stuccos, cements, etc., has been introduced to the trade by the Liquilox Company, Ltd., Los Angeles, Cal.

According to the manufacturers, this new protective coating is a product manufactured by secret process from an ore mined in the western United States. It has been under the process of experimentation for over six years and has proved highly adaptable to the coating of all those surfaces previously mentioned.

An example of its resistance to alkali follows: Seven plating tanks (of a major plating company), one containing eighteen pounds of potassium

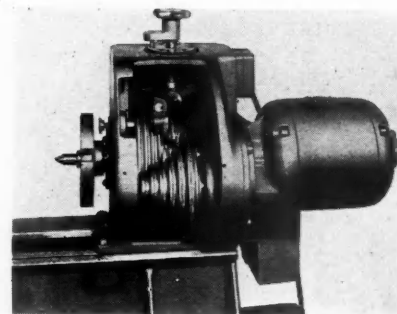
cyanide per gallon, were coated with one coat of Liquilox. After eighteen months of service the tanks were examined and found to be in splendid condition and capable of many more months of service without reconstructing or reconditioning.

"Liquilox" may be applied with either gun or brush to hot or cold surfaces.

### General Screw Cutting Lathe

The General Radial Drill Co., Cincinnati, Ohio, has placed on the market a new Model "B" Screw Cutting Lathe, which is especially adaptable to automotive service work. The swing is 11 in., and is made in 4-ft., 5-ft. and 5½-ft. lengths of bed.

This new unit incorporates the Gibbs V-Disk Drive, which runs as an idler between the driving and the driven cones. The drive will not slip, its life is long, and replacement cost is small.



A star knob on top of the enclosed head adjusts the speeds. Model "B" has a thread range of from 8 to 224 threads per inch. It is especially adaptable for such work as refacing valves, finishing pistons, truing armature commutators, making bushings, turning of all kinds, etc.

The spindle is hollow for long work. The compound has 2¼ in. travel and may be adjusted to any degree angle. The cross slide has 6½ in. travel. Carriage, bottom and top slides have gibbs which are adjustable to wear.

### "Cee-Bee" Cleaning Compounds Introduced

A new product important to users of cleaning compounds was recently announced by the Cee-Bee Laboratories, Ltd., Los Angeles, Calif. According to the manufacturers, "Cee-Bee Cleaning Compounds Supreme" by analysis are found to contain no acidic preparations or other harmful ingredients that are dangerous to man or product. They are strictly physical agents and do not combine with oil, grease or any foreign matter known as "dirt." They clean by a process of defloculation of solids and the emulsification of liquids. They may be applied by hand, by immersion, by pressure gun or through circulation.